PB 131891 T-55

CENTRAL INTELLIGENCE AGENCY

SCIENTIFIC INFORMATION REPORT

7 October 1960

Distributed Only By
U.S. DEPARTMENT OF COMMERCE
OFFICE OF TECHNICAL SERVICES
WASHINGTON 25, D.C.

Issued semi-monthly. Annual subscription $28.00 ($4 additional for foreign mailing). Single copy $2.75.

Use of funds for printing this publication approved
by the Director of the Bureau of the Budget July 31, 1958.

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100640001-3

PLEASE NOTE

This report presents unevaluated information extracted from recently received publications of the USSR and Eastern Europe. The information selected is intended to indicate current scientific developments and activities and is disseminated as an aid to research in the United States.

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I. BIOLOGY

Biochemistry

1. Amino Acids Produced by Photosynthesis

"Photosynthesis by the Action of Shumanovskaya Radiation," by N. Ya. Dodonova, A. I. Sidorova, and A. N. Terenin, Vestn. Leningr. Un-ta. (Herald of Leningrad University), No 16, 1959, pp 33-38 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 13, 1960, Abstract No 17818, by B. Pleshkov)

"Experiments concerning the photosynthesis of amino acids from natural gases are described. A 1-kw. hydrogen lamp having a multi-line, continuous spectrum with an energy distribution approaching the spectrum of the short-wave radiation of the sun was used as a source of light. A mixture of water vapor, NH_3, CH_4, and CO were exposed; the pressure of the water vapor, NH_3, and CO was 100 mm Hg, and of the CH_3, 500 mm. The length of exposure was 24-26 hr. The reaction products were absorbed by H_2SO_4 and analyzed by paper chromatography with a butanol-water-CH_3COOH (4:1:1) solvent. It was determined that as a result of the photo-reaction, some amino acids were synthesized, among which alpha-alanine, alpha-aminobutyric acid, valine, and norleucine were identified. In the control experiments, amino acids were not found after the exposure of water vapor and NH_3."

Botany

2. Arctic Botanical Research

"The Temperature of Arctic Plants," by B. A. Tikhomirov, V. F. Shamurin, and V. S. Shtepa, Botanical Institute imeni V. L. Komarova, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Biologicheskaya, No 3, 1960, pp 429-442

In 1955 a number of Arctic plants were subject to temperature measurements with a microelectrothermometer designed by the Institute of Agrophysics (Leningrad). The investigations were conducted in the Tiksi, region Yakutsk ASSR (Lat. 71°35' N).

An extremely high dependence of plant temperature on direct solar radiation was proved: on sunny days the temperature of leaves and other parts of the plants exceeded by a few degrees (2-5° C) that of the surrounding air; on the other hand, during cloudy weather, the temperature of leaves, flowers, etc. may fall below that of the air.

The extremely unequal temperature of different parts of the plants due to vertical temperature gradients of the surrounding air and soil is very noticable. Highest temperatures were recorded in the plant parts nearest the soil surface (the rosette leaves and others).

At the same time, the uneven heating of the plants depends on their being exposed unilaterally to sunlight and wind (lateral temperature gradient).

The temperature of the flowers is somewhat correlated with the color of the corolla: dark-colored flowers were heated more intensively than light-colored.

The authors added that this report is only a preliminary one. They are continuing the investigations on Arctic plants since the temperature of Arctic plants is indispensable to providing the complete thermal characteristics of Arctic plant associations and to elucidating their relations to the environment.

Microbiology

3. Japanese Encephalitis Virus Modification Studied

"Further Observations on the Properties of an Altered Strain of Japanese Encephalitis (Experiments on Monkeys)," by A. I. Yakovlev, Nasledstvennost' i Izmenchivost' Rasteniy, Zhivotnykh i Mikroorganizmov (Heredity and Modifiability of Plants, Animals, and Microorganisms), 1959, pp 331-337 (from Referativnyy Zhurnal -- Biologiya, No 14, 25 Jul 60, Abstract No 64394, by B. Semenov)

"A virus variant which was obtained earlier by the author by passages through pigeon brains and which is not pathogenic for white mice was investigated in rhesus monkeys. One ml of a 20% suspension of chick embryos infected with an attenuated strain was introduced intranasally to animals weighing 2.5-3.5 kg. A general reaction to the introduction of the virus was manifested by a slight titer increase during the first 48 hours. No changes in the weight of the animals and in the morphological picture of their blood were observed. The appearance of antibodies which neutralized 10-1000 MLD of virus were seen in serum from monkeys 2 weeks after vaccination. Intranasal infection of the inoculated monkeys with a pathogenic

strain produced fever; complications were noted in one case out of six. Severe disease with paralysis and paresis of the fore and hind extremities was noted in control animals after the introduction of the same dose of virus."

4. Tick-Borne Recurrent Typhus Pathogen Cultured

"The Problem of Culturing Spirochetes of Tick-Borne Relapsing Fever (Caucasian and Central Asian Forms)." by V. M. Petrikova, Sb. Nauchn. Tr. Stavropol'sk. N.-I. In-t Vaktsin i Syvorotok (Collection of Scientific Works of the Stavropol Scientific Research Institute of Vaccines and Sera), No 5, 1958, pp 311-316 (from Referativnyy Zhurnal -- Biologiya, No 13, 10 Jul 60, Abstract No 59514)

"The results of culturing three strains of spirochetes of tick-borne relapsing fever -- Spirochaeta caucasica (Dagestan strain), Sp. persica (Miane strain), and Sp. uzbekistanica (Ramit strain) -- for 3 years on Gel'tser medium are described."

Radiobiology

5. Migration of Radioactive Strontium in Biogeocenosis

"Concerning the Problem of the Migration of Radiostrontium in Biogeocenosis," by N. A. Timofeyeva, Institute of Biology, Ural Affiliate of the Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 133, No 2, 11 Jul 60, pp 488-491

The article described discusses various factors (sorption and desorption, plant uptake and root systems, humus formation, ionexchange reactions, etc.) involved in the transformation, concentration, and horizontal and vertical distribution of radiostrontium in soil and water.

Results of these experiments indicate that, comparatively speaking, Sr^{90} does not migrate far from the site of its fall to a (70-cm depth) and that it travels more than twice as far horizontally as vertically. Various determinations are presented in three tables.

6. Contamination of Underground Waters by Migrating Products of Uranium Fission

"Concerning the Migration of the Products of Uranium Fission in Underground Waters," by A. S. Belitskiy and Ye. I. Orlova; Moscow, Gigiyena i Sanitariya, No 6, Jun 60, pp 3-8

An extensive amount of research is being conducted currently on the migration of radioactive products of uranium fission in underground waters.

Since ruthenium-106, cesium-137, and strontium-90 are the most significant of all the products of uranium fission with regard to sanitation, field and laboratory tests were conducted on the migration of these radioactive isotopes.

Results showed that the migration of these substances depends on the flow-rate of the water and the sorption capacity and retention of these isotopes by the rocks (ruthenium is poorly sorbed, but has a short half-life; cesium is readily sorbed and retained by the rocks, thus does not appear in water; and strontium saturates the rocks in the immediate area of contamination and does not migrate far).

In view of these findings, the solution of sanitary problems connected with the radioactive contamination of underground waters with hazardous radioactive products of uranium fission ought to be considered individually and depends on the degree and type of contamination and on the local hydrogeological conditions.

7. Distribution of Radioactive Iron, Cobalt, Zinc, and Cerium in Natural Biogeocenosis

"An Attempt to Study the Distribution of Radioactive Isotopes in Natural Biogeocenosis Experimentally," by G. I. Makhonina, I. V. Molchanova, Ye. N. Subbotina, N. V. Tomofeyev -- Resovskiy, A. A. Titlyanova, and A. N. Tyuryukanov; Moscow, Doklady Akademii Nauk SSSR, Vol 133, No 2, 11 Jul 60, pp 484-487

In the research described, the authors attempted to study the behavior of the chemical elements in the biosphere with regard to the complex problem of the migration and distribution of radio-isotopes: Fe^{59}, Co^{60}, Zn^{65}, and Ce^{144}. The soil was irrigated with water containing the above mentioned radioactive elements in trace amounts.

The authors discuss the various aspects of the problem and present figures on the distribution of Fe^{59}, Co^{60}, Zn^{65}, and Ce^{144} as components of the biogeocenosis, their distribution in the soil profile; and the relative activity in one g of dry weight of the above-ground mass to one g of the dry weight of roots (coniferous and deciduous plants).

Results show that the content of the radioactive isotopes in the above-ground bio-mass changes by a fraction of one percent, while in the roots, it changes by whole units of percent. The iron and zinc which are absorbed in the bio-mass are more active than the cobalt and cerium both in the above-ground portion and in roots of plants. Cobalt is the least mobile, then zinc follows, cerium is far more mobile, and iron is the most mobile radioactive element in the soil.

8. Embryo Radiosensitivity and Radiation Embryopathy.

"Radiosensitivity of Embryos and Methods of the Formation of Radiation Embryopathy," by P. G. Svetlov, Yezhegodnik. In-t Eksperim. Med. AMN SSSR (Annual of the Institute of Experimental Medicine, Academy of Medical Sciences USSR), 1957-1958, pp 403-409; (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 60, Abstract No 28707, by P. G. Svetlov)

"The radiosensitivity of rat embryos during the first-14 days of their development, after a single total X-irradiation of the pregnant females by 30-400 r doses, was determined. After the use of the median doses (150-200 r), two sharp maxima of embryo radiosensitivity were noted, i. e., on the 4th and on the 10-12th days of development. These periods coincide exactly with the maxima of sensitivity of rat embryos to exogenic hyperthermia of the mother's body and to the toxic effect of narcotics. The first of these temporary increases in sensitivity to pathogenic agents coincides with the preimplantation period in the development of the embryos, and the second, to the period of the formation of the placenta as an organ (a short period in its development). The function of the vulnerability of the embryo to the dose of irradiation is expressed by a logarithmic curve or by a curve of the sigmoid type (nonlinear ratio.). The threshold of radio-sensitivity during the critical periods of development is below 30 r; and after irradiation by this dose during the above-mentioned periods of development, it is possible to note pathological manifestations in the form of edema, stasis, hemorrhages, etc. The pathogenic action of irradiation is due, in addition to its direct effect, to its action on the maternal organism.

Soil Biology

9. Effect of Chemicals on Soil Microflora

"The Effect of the Frequent Use of Herbicides on Soil Microflora," by L. Yu. Klyuchnikov and A. N. Petrova, Institute of Agriculture of the Black Earth Belt imeni V. V. Dokuchayev, Kamennaya Step', and Institute of Microbiology, Academy of Sciences USSR, Moscow; Moscow, Mikrobiologiya, Vol 29, No 2, Mar/Apr 60, pp 238-241

Chemical weed control studies were conducted during 1956-1958 on plantings in common chernozem soil of the field-protecting forest belts. Treatment was conducted with 2,4-D four times, with tractor kerosene twice, and with 2M-4X preparation once. Control rows were weeded by hand. Toward the end of the season of the second year, the microflora of the oak seedling rhizospheres were studied. Soil samples were taken from the roots at a depth of 20 cm on the seventh and ninth days after treatment with 2,4-D. The herbicides did not cause any pronounced negative changes in the microflora. Some decrease was noted in the number of actinomyces, as well as a change in the species and quantitative composition of the fungi.

Miscellaneous

10. A. Ye. Kriss-1960 Lenin Prize Winner

Unsigned Notice; Moscow, Izvestiya Akademii Nauk SSSR-Ser. Biol., No 3, May/Jun 60, p 479

Doctor of Biological Sciences Anatoliy Yevseyevich Kriss has been awarded the Lenin Prize for 1960 for his scientific work: Morskaya Hidrobiologiya (Glubokovodnaya) [Marine Hydrobiology (Deep Water)]. Dr Kriss' work has been judged the most outstanding effort by the Committee for Lenin Prizes in the Field of Science and Technology under the Council of Ministers of the USSR. The book was published in 1959.

II. CHEMISTRY

Fuels and Propellants

11. Interaction of Ethyl Radicals With Molecular Oxygen in the Presence of a Third Particle

"Kinetics and Mechanism of the Interaction Between Ethyl Radicals and Molecular Oxygen; Part 2 -- Dependence of the Reaction Kinetics on a Third Particle," by L.I. Avramemko and R. V. Kolesnikov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR-Otdeleniye Khimicheskikh Nauk, No 6, Jun 60, pp 989-995

The relation between the velocity constant of the recombination of ethyl radicals and the pressure was investigated. It was found that the recombination of ethyl radicals proceeds in a manner which is typical for trimolecular reactions. The absolute magnitude of the velocity constant was determined. The dependence on the pressure of the effective velocity constant of the reaction between ethyl radicals and molecular oxygen was investigated in the pressure range of 1-13 millimeters of mercury. The absolute value of the velocity constant of the bimolecular reaction between the radical C_2H_5 and the molecule O_2 leading to the formation of the energy-rich radical $C_2H_5O_2$* was determined. The upper limiting value of the velocity constant of the trimolecular reaction leading to the formation of the normal radical $C_2H_5O_2$ from the radical C_2H_5 and the molecule O_2 in the case when the molecule H_2 is the third particle was also determined.

12. Thermal Explosion of Dinitroxydiethylnitramine Under Conditions of Convective Heat Transfer

"The Thermal Explosion of Dinitroxydiethylnitramine Under Conditions of Purely Convective Heat Transfer," by F. I. Dubovitskiy, V. V. Barzykin, and A. G. Merzhanov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Izvestiya Akademii Nauk SSSR-Otdeleniye Khimicheskikh Nauk, No 6, Jun 60, pp 1124-1126

A method has been developed for the investigation of thermal explosions of liquid and molten solid substances under conditions when heat transfer takes place soley by convection. The critical conditions for the thermal explosion of dina (dinitroxydiethylnitramine) were determined. It was found that there is good agreement of the experimentally determined critical temperatures and degrees of heating ($\Delta T = RT_0^2 / E$) with those calculated on the basis of Semenov's theory.

Geochemistry

13. Formation of Methane by Microorganisms in Petroleum Deposits

"Formation of Methane by Microorganisms in Petroleum Deposits," by V. A. Ekzertsev, Institute of Microbiology, Academy of Sciences USSR; Moscow, Geokhimiya, No 4, May 60, pp 362-370

Microbiological processes of methane formation in petroleum deposits of the Ural-Volga petroleum-bearing regions were studied. The microflora are rather widely distributed in these deposits. The microorganisms are usually bound to the producing bed. Laboratory experiments show that one of the chief methane sources in the deposits is the anaerobic decay of petroleum under the influence of vital activity of microorganisms. A certain amount of methane is apparently formed as a result of biochemical processes of carbon dioxide reduction by molecular hydrogen. Pure cultures of bacteria have been isolated which under laboratory conditions decompose the petroleum to gaseous products. Methane, hydrogen, carbon dioxide, and nitrogen enter into the composition of the gases.

Industrial Chemistry

14. Interactions Between the Sulfates and Sulfides of Two Different Metals

"Some Distinguishing Characteristics of the Interaction of Sulfates With Sulfides," by N. F. Uspenskiy and N. P. Diyev (deceased), Institute of Metallurgy of the Ural Affiliate of the Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 5, May 60, pp 1022-1027

On the basis of experimental results and thermodynamic analysis, the different types of reactions between sulfides and sulfates of two different metals are discussed. The relationships pertaining to reactions of this type are derived from experimental results applying to the interaction of gypsum with iron pyrite and that of gypsum with nickel sulfide leading to the formation of ferrous oxide and nickel oxide, respectively. The reactions in question proceed with the formation of calcium oxide and the evolution of sulfur dioxide.

15. Synthesis of Organosilicon Oligomers Containing Hydroxyphenyl Groups

"The Synthesis of Organosilicon Oligomers Containing Hydroxyphenyl Groups," by K. A. Andrianov, A. A. Zhdanov, and T. S. Baksheyeva; Moscow, Plasticheskiye Massy, No 5, Jun 60, pp 18-21

Organosilicon polymers that contain hydroxyphenyl groups are of considerable interest from the standpoint of the preparation of heat-resistant plastics. Synthesis is described of new organosilicon oligomers containing the grouping $SiOC_6H_5C(CH_3)_2C_6H_4OH$. When subjected to the action of aldehydes, these substances are transformed into 3-dimensional polymers.

16. Synthesis of New Polymers by the Catalytic Polymerization of Organosiloxanes

"Synthesis of New Polymers by the Catalytic Polymerization of Organosiloxanes," by K. A. Andrianov, S. I. Tchenchel'-skaya, and Yu. K. Petrashko; Moscow, Plasticheskiye Massay, No 3, Apr 60, pp 20-23

The process of the catalytic polymerization at 120° of cyclic products containing phenyl, phenylmethylsiloxane groups and phenyl, phenylmethyl, and dimethylsiloxane groups was investigated. Ethylsulfuric acid was used as a catalyst. It was established that as a result of the combined hydrolysis of phenyltrichlorosilane with phenylmethyldichlorosilane or of these two products with dimethyldichlorosilane, cyclization takes place. The cyclized products that form undergo partial polymerization only as the result of the action of an acidic catalyst at an elevated temperature.

During the process of polymerization, there is partial splitting off of phenyl groups, with the result that low-molecular polymers with a branched structure are formed.

17. Enthalpy of the Formation of Carbon Tetrafluoride

"The Standard Enthalpy of the Formation of Carbon Tetrafluoride," by A. F. Vorob'yev and S. M. Skuratov, Thermochemical Laboratory imeni V. F. Luginin, Moscow State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 7, Jul 60, pp 1398-1401

The enthalpy of the reaction of carbon tetrafluoride with metallic sodium was determined and found to be equal to minus 325.5 ± 2.2 kilocalories per mol of CF_4. On the basis of data published in the literature, a value for the standard enthalpy of the formation of NaF corresponding to minus 136.17 ± 0.3 kilocalories per mol was picked. The standard enthalpy of the formation of carbon tetrafluoride was determined and found to be equal to minus 219.2 ± 2.3 kilocalories per mol.

The work described in this paper was carried out in 1954-1955.

18. Anhydrous Lead Perchlorate

"Anhydrous Lead Perchlorate," by A. A. Zinov'yev and N. V. Krivtsov, Laboratory of Inorganic Synthesis, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 7, Jul 60, pp 1418-1422

A method is described for the preparation of anhydrous lead perchlorate. The specific gravity and heat of dissolution of anhydrous lead perchlorate were determined and found to be equal to $d_4^{25} = 4.84$ and $N_{2500}^{25^0} = 1.04$ kilocalories per mol. The behavior of anhydrous lead perchlorate during heating was investigated by a thermographic method. It was found that the thermal decomposition of the perchlorate is an exothermal process. Indications were found that a phase transformation of anhydrous lead perchlorate takes place at 228°.

19. Reaction of Titanium Tetrachloride With Magnesium

"Velocity of the Interaction of Titanium Tetrachloride With Magnesium," by R. A. Sandler, All-Union Aluminum-Magnesium Institute; Leningrad, Zhurnal Prikladnoy Khimii, Vol 33, No 7, Jul 60, pp 1465-1470

It was established that the nature of the interaction between $TiCl_4$ and Mg is determined by the concentration of titanium tetrachloride vapor. At vapor concentrations higher than 1.7×10^{-2} mols/liter the role played by reactions in the gas phase above the surface of the melt is insignificant, and the velocity of the process does not depend on the concentration. At lower concentrations, the interaction in the gas phase becomes more prominent, and the velocity of the reaction corresponds to that of an interaction of the second order. The high value of the energy of activation (approximately 22,000 calories) indicates that under these conditions, the process takes place in a region close to that of a kinetic interaction.

20. Electrochemistry of Titanium Carbide

"The Electrochemical Behavior of Titanium Carbide in a Chloride Melt," by M. V. Smirnov and Yu. N. Krasnov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1241-1247

Work described in this instance is a continuation of research conducted at the author's laboratory in the field of the electrochemistry of lower oxides, nitrides, and carbides of transitional high-melting metals.

The anodic dissolution of titanium carbide during the electrolysis of a molten eutectic mixture of the chlorides of lithium and potassium was investigated in the temperature range of 400-700°. The current yields and the valency of the titanium entering into the chloride melt were determined. It was established that at Da $\geq$ 0.1 a/centimeters^2, there is mainly formation of $TiCl_4$ at the carbide anodes in the temperature range in question. The titanium tetrachloride distils out of the electrolyte.

The anodic potential of titanium carbide having the composition $Ti_{1.04}C$ was investigated in the chloride melt in the extensive range of current densities from 5×10^{-4} amperes per square centimeters to one ampere per cm^2 at temperatures from 530-800°. It was established that the dissolution of the carbide anodes under these conditions takes

place at potentials which, depending on the current density and the temperature, are more negative by 0.6-1.4 volts than that of the separation of chlorine. This dissolution is accompanied by a considerable amount of polarization reaching values of 0.5-0.65 volts.

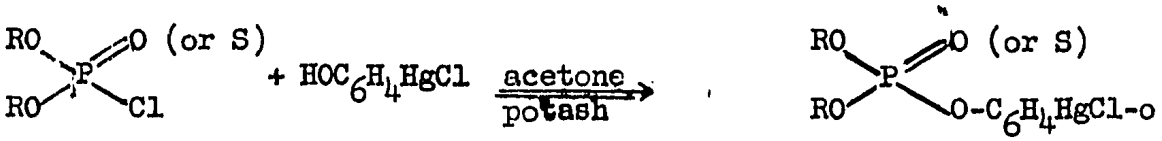
By measuring the electromotive force of the cell Ti/Ti Cl_2, Ti Cl_3, Li Cl, K Cl melt/$Ti_{1+x}C$ at 425-725°, the temperature dependence of the difference of potential between carbide electrodes having the limiting compositions of the δ phase (Ti C, and $Ti_{1,6}$ C) was determined. From experimental and published data, the changes of the isobar potential, of the enthalpy, and of the entropy were calculated which take place when the composition is changed within the limits of the δ phase of the system Ti-C.

Insecticides

21. Combination Insecticide-Fungicides

"Esters of Phosphoric Acids Containing Mercury Radicals,"
by M. S. Malinovskiy, D. G. Yurko, and V. B. Tul'chinskiy;
Moscow, Zhurnal Obshchey Khimii, Vol 30, No 7, Jul 60,
pp 2170-2171

Compounds containing mercury, up to the present, appear to be the most effective types for controlling bacterial and fungus diseases of plants, according to the authors. These compounds are characterized by a universality of action and do not reduce the germination of the seeding material treated by them. The authors of this report attempted to obtain the compounds of type I below which, in all probability, should combine in themselves the high insecticidal activity of organophosphorus compounds and the bactericidal and fungicidal activity of organomercury compounds.



(I)

To obtain these compounds, the authors started with dialkylchlorophosphates, dialkylchlorothiophosphates, and o-hydroxyphenylmercurous chloride. Condensation of the latter with dialkylchlorophosphates and dialkylchlorothiophosphates was conducted in aqueous, acetone, and benzene media at 20-80°.

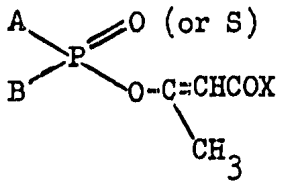
To take up the hydrochloric acid formed during the course of the reaction, sodium hydroxide, triethylamine, pyridine, and potash were employed. It appeared that the best conditions for the condensation involved the use of an acetone or benzene medium in the presence of anhydrous potash and its completion cold after 6-8 hours or at 50-80° in 1-2 hours; in the latter case, the yield of the products is considerably lower.

In all six, previously underscribed organophosphorus-mercury compounds were obtained. Their physical constants are given in the report.

22. Strong Contact-Type Insecticides Described

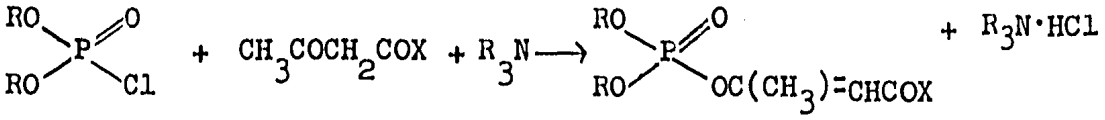
"Organophosphorus Insecticides. Derivatives of β-Dicarbonyl Compounds," by M. I. Kabachnik, P. A. Rossiyskaya, M. P. Shabanova, D. M. Paykin, L. F. Yefimova, and N. M. Gamper, Institute of Organo-Elemental Compounds of the Academy of Sciences, USSR; Moscow, Zhurnal Obschchey Khimii, Vol 30, No 7, Jul 60, pp 2218-2223

In a systematic examination of the insecticidal properties of derivatives of phosphoric and thiophosphoric acids exhibiting phosphorylating properties, the authors have synthesized and studied the toxicity of a series of esters of phosphorus acids and enol forms of β-dicarbonyl compounds of the general type:

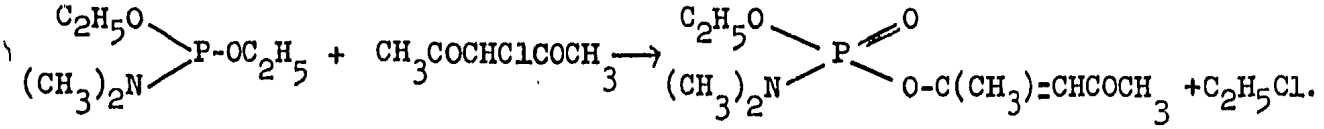


where A and B are either alkoxy or dialkylamide groups, while X is either an alkyl or an alkoxy.

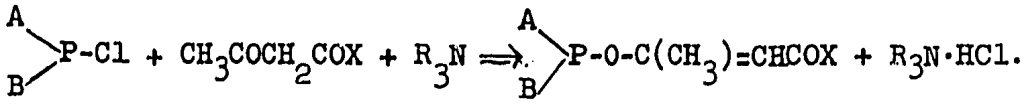
The authors produced the esters of dialkylphosphoric acids and the enol forms of acetylacetone or of the acetoacetic ester by reacting dialkylchlorophosphates with the corresponding β-dicarbonyl compound in presence of tertiary amine, i.e., under conditions for the O-acylation of β-dicarbonyl compounds according to Claesson:



The authors were unable to obtain the derivatives of dialkylamidophosphoric acids by this method. However, these substances were readily obtained by the method of Kreytzkamp and Kayser, for example:

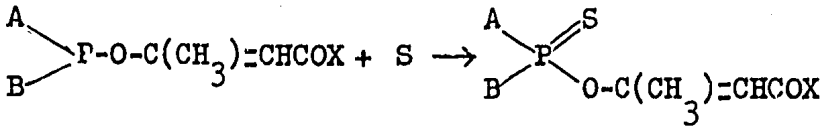


The derivatives of thionophosphoric acid containing alkoxyl or dialkylamido groups were synthesized by another method. First, dialkylchlorophosphites or the corresponding dialkylamide derivatives were reacted with β-dicarbonyl compounds under acylation conditions according to Claesson to obtain the derivatives of phosphoric acid:



(A and B = RO or R_2N; X = CH_3 or OR)

These derivates easily add on sulfur in a solution of carbon bisulfide to form the sought for derivatives of thionophosphoric acid:



The constants and analyses of the substances produced are presented in a table. A total of 15 compounds are listed.

The synthesized compounds were studied in laboratory tests as insecticides with both contact (against the marine mealybug) and systemic (against the spider mite and the Eurygaster integriceps)action. Only the results for the contact activity of these insecticides are presented.

Whereas the lethal dose (LD) for Thiophos ensuring 95-100% mortality of the mealybug was 0.03 mg, on contact, the LD_{95-100} for these compounds ranged from 0.01 for (diethyl [carbomethoxypropenyl-2] phosphate -- $[C_2H_5O]_2P[O]OC[CH_3]=CHCOOH_3$) to 0.04 or dimethylamidoethyl-(pentenonyl-2) phosphite -- $C_2H_5O\ [(CH_3)_2N]POC(CH_3)=CHCOCH_3$.

A total of seven compounds were more active contact insecticides than thiophos.

Although data on the toxicity of these compounds as systemic insecticides were not presented, the authors stated that a majority of the tested compounds were only slightly active as systemic acaricides. Only three of the described compounds, including the above-mentioned diethyl (carbomethoxypropenyl-2) phosphate, exhibited definite systemic action for a short-term period.

23. Thiophos and Metaphos Production Method

"Method of Producing Thiophos (Paranitrophenyldiethylthiophosphate) and Metaphos (Paranitrophenyldimethylthiophosphate')," by N. N. Mel'nikov, L. P. Kofman, S. L. Varshavskiy, L. V. Andrianova, Ya. A. Mandel'baum, D. M. Belov, and Z. M. Bakanova; Moscow, Byulleten' Izobreteniy, No 6, 1960, p 19

Patent No 126880 has been issued to the above-named persons for a method for producing thiophos and metaphos by reacting paranitrophenol and diethyl- or dimethylchlorothiophosphate in the presence of an alkali. To decrease the reaction temperature and to obtain a high purity product, the process is conducted in the presence of nonionic surface-active substances of the hydroxyethylated alkylphenol types.

24. Solubilities of the Diether Adduct of Beryllium Bromide in Ether

"Investigation of Solubilities in the System Diether Adduct of Beryllium Bromide - Ether," by N. Ya. Turova, A. V. Novoselova, and K. N. Semenenko, Moscow State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 4, Apr 60, pp 941-944

The solubilities in the system diether adduct of beryllium bromide-ether in the temperature range from minus 50° to plus 100° were investigated. It was established that the compound $BeBr_2 \cdot 3 (C_2H_5)_2O$ is formed and that at minus 4° this compound is converted into $BeBr_2 \cdot 2 (C_2H_5)_2O$. The dimensions of the unit cell of the crystal lattice of the diether adduct were determined.

25. Electrolytic Deposition of Uranium Layers

"Electrolytic Deposition of Layers of Uranium Compounds With a Density of 1-3 Mgs per cm^2," by V. F. Titov; Moscow, Atomnaya Energiya, Vol 8, No 3, Mar 60, pp 257-258

A method is described for the deposition of uranium in the form of its hydroxide on the surface of aluminum cathodes. Uranium is deposited from an ammonium oxalate solution. Uniform uranium layers deposited on solid metal cathodes are used in research in nuclear physics.

26. Solvent Extraction of Nuclear Fuels and Other Materials

"Investigation by the Distribution Method of the Formation of Complexes in Solutions," by A. P. Zozulya and V. M. Peshkova, Leningrad State University imeni A. A. Zhdanov; Moscow, Uspekhi Khimii, Vol 29, No 2, Feb 60, pp 234-268.

Mathematical methods for investigation by the distribution method of the formation of complexes in connection with solvent extraction procedures are outlined. Work in this general field is reviewed mainly on the basis of non-USSR publications. Among the concrete examples discussed, particular attention is paid to the extraction of uranium, thorium, and plutonium. Information is also given on the extraction of other elements of importance in nuclear technology (e. g., zirconium and rare-earth elements) and the production and purification of semiconductor materials (e. g., In).

27. Heats of Formation of Niobium Oxides and Carbides

"Heats of Formation of Niobium Oxides and Carbides," by F. G. Kusenko and P. V. Gel'd, Ural Affiliate of the Academy of Sciences USSR; Novosibirsk, Izvestiya Sibirskogo Otdeleniya Akademii Nauk SSSR, No 2, Mar 60, pp 46-52.

Because of the expanding production of niobium and increased interest toward the carbothermic method of the production of this metal, the knowledge of thermochemical characteristics of the oxides and carbides of niobium acquires increasing importance. In the investigation described, the heats of oxidation of niobium oxides, niobium carbides, niobium hydride, and also of metallic niobium, graphite, and acetylene black have been determined. On the basis of the data obtained, the heats of formation of niobium oxides and carbides, as well as niobium hydride (of the composition $NbH_{0.761}$), from the elements were determined.

28. Internal Friction in Uranium

"Internal Friction in Uranium," by A. I. Dashkovskiy, A. I. Yevstyukhin, Ye. M. Savitskiy, and D. M. Skorov; Moscow, Atomnaya Energiya, Vol 9, No 1, Jul 60, pp 27-32

The dependence of internal friction of uranium and of the shear modulus of uranium on the temperature was investigated. It was established that internal friction in α-uranium depends on the heat treatment and drops after annealing in the β - and γ-regions. When polymorphous modifications take place, the internal friction changes its value isothermally. The transitions $\alpha \longrightarrow \beta$ and $\gamma \longrightarrow \beta$ are accompanied by a reduction of the internal friction, while the transformations $\beta \longrightarrow \gamma$ and $\beta \longrightarrow \alpha$ involve an increase in internal friction. Every polymorphous modification of uranium exhibits internal friction of a specific magnitude within the temperature range of the existence of the modification in question.

29. Constitutional Diagram of the System Zirconium-Beryllium

"Phase Diagram of the System Zirconium-Beryllium," by V. S. Yemel'yanov, Yu. G. Godin, A. I. Yevstyukhin, and A. A. Rusakov; Moscow, Atomnaya Energiya, Vol 9, No 1, Jul 60, pp 33-38

By applying methods of metallographic, thermal, and X-ray qualitative phase analysis and also by measuring the hardness, the system zirconium-beryllium was investigated. On the basis of the data obtained, a phase diagram of this system was constructed. It was established that four

intermediate phrase, namely, $ZrBe_2$, $ZrBe_6$, $ZrBe_9$, and $ZrBe_{13}$, form within this system. The first three compounds form by peritectic reactions at temperatures of 1,235, 1,475, and 1,555°, respectively; $ZrBe_{13}$ melts with an open maximum at 1,645°. At 965° and at the point corresponding to 5% by weight of beryllium, eutectic is formed by $ZrBe_2$ and zirconium. Addition of beryllium to the zirconium leads to a lowering of the temperature of the α - β transformation and formation of a eutectoid at 800°. The solubility of beryllium in α - zirconium amounts to less than 0.1% by weight and its solubility in β-zirconium to less than 0.3% by weight. The solubility of zirconium in beryllium does not exceed 0.3% by weight.

30. Rare Earths in Perovskites (Knopites) From Massifs of Ultrabasic-Alkaline Rocks

"Rare Earths in Perovskites (Knopites) From Massifs of Ultrabasic-Alkaline Rocks," by L. S. Borodin and R. L. Barinskiy, Institute of Mineralogy, Geochemistry, and Crystal Chemistry of Rare Elements, Academy of Sciences USSR; Moscow, Geokhimiya, No 4, May 60, pp 291-297

In the study of correlations between the elements of the cerium group in perovskites, the authors have used a new method of representing the composition of cerium minerals with the aid of a graph showing the dependence of the concentration of individual rare-earth elements on the lanthanum content taken as an indicator of the alkalinity of the medium (mineral-forming solutions).

As a result of the investigation, a regular change in the concentration of individual rare earth elements in the course of the transition from early perovskite generations to late ones is established. The late generations containing a heightened amount of rare earths are as well characterized by a heightened concentration of praseodymium and neodymium accompanied by a simultaneous decrease in the relative lanthanum concentration. This regularity, as well as the absence of a direct correlation between the rare-earth composition and the type of rock containing perovskite, may be regarded as arguments in favor of the hydrothermal (metasomatic) genesis of perovskite.

31. U^{235} Excess in Magnetite With a Heightened Actinium Content

"U^{235} Excess in Magnetite With a Heightened Actinium Content," by V. V. Cherdyntsev, Ye. A. Isabayev, Yu. A. Surkov, D. P. Orlov, and E. P. Usatov, Kazakh State University imeni S. M. Kirov and Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR; Moscow, Geokhimiya, No 4, May 60, pp 373-374

An excessive U^{235} content has been detected in magnetite which also contains excessive actinium. It is supposed that both effects are conditioned by the complicated spontaneous decay of a transuranium isotope which acts as an emitter, small amounts which have been preserved and still exist in nature.

32. Use of the Isotope Composition of Lead in Prospecting for Uranium Ores

"Use of the Isotope Composition of Lead in Prospecting for Uranium Ores," by D. Ya. Surazhskiy and A. I. Tugarinov; Moscow, Atomnaya Energiya, Vol 9, No 1, Jul 60, pp 21-26

This article discusses the probable reasons for the appearance of anomalous types of lead and the possibility of utilizing isotope anomalies of lead in prospecting for uranium deposits. It is assumed that the presence of lead with a sharply increased content of radiogenic isotopes (Pb^{207}, Pb^{206}) is due to the following geological processes: (1) rapid accumulation of fresh deposits because of intensive erosion of ancient uranium occurrences; (2) assimilation by the magma and deeply situated granites of uranium rocks which originated a long time before the beginning of magma activity; (3) hydrothermal metamorphosis of uranium ore bodies; and (4) hypergenesis of uranium deposits in the oxidation zone.

33. Book on the Analytical Chemistry of Zirconium

Analiticheskaya Khimiya Tsirkoniya (The Analytical Chemistry of Zirconium), by S. V. Elinson and K. I. Petrov, unsigned review; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, p 582

This book, published by Atomizdat at Moscow, 1960 (212 pp, price 7 rubles, 80 kopecks), reviews the chemical and physico-chemical properties of zirconium and its compounds. The principal analytical reactions for zirconium and methods of detecting this element in different materials are described. Methods for the separation of zirconium from other elements are discussed. Gravimetric, volumetric, calorimetric, and spectroscopic methods for the determination of zirconium in alloys, salts, and other materials are discussed in detail. Extensive treatment is given to methods for the determination of carbon in zirconium and of elements giving rise to the formation of gases in that metal. Chemical and spectroscopic methods for the determination of other microimpurities in zirconium and of components other than zirconium in alloys of this metal are discussed.

The book can be used for reference by workers at plant laboratories and scientific research institutions and also as a textbook by students at chemical and metallurgical higher educational institutions.

34. Effect of Irradiation With Neutrons on the Mechanical Properties of Some Reactor Construction Materials

"The Mechanical Properties and Microstructure of Some Construction Materials After Irradiation With Neutrons," by I. M. Voronin, V. D. Smitriyev, Sh. Sh. Ibragimov, and V. S. Iyashenko; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, pp 514-518

This article presents data on the effects of irradiation under conditions that were encountered during the operation of the reactor of the first USSR Nuclear Electric Power Station. The effects of nuclear irradiation on austenite, ferrite, ferrite-martensite steels, and molybdenum are reported. It was established that there is a sharp drop in the ductility of austenite and ferrite steels, as well as molybdenum, as a result of irradiation with a total flux of 0.9×10^{20}-3.4×10^{20} neutrons per square centimeter at a temperature in the range of 450-650°. It was found that the causes of embrittlement of steel are different from those of molybdenum. The information given may be of use in the designing of new nuclear electric power stations.

35. New Developments in the Design and Layout of Nuclear Reactors

"New Developments in the Design and Layout of Nuclear Reactors," by A. N. Komarovskiy; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, pp 505-513

This article discusses the layout of reactor buildings and their design. The advantages and disadvantages of subterranean and surface locations of buildings are pointed out. Methods applied at present in the construction of concrete shields of stationary power reactors are described. Detailed treatment is given to problems pertaining to the use of explosion-proof protective domes. Economic considerations which enter into the application of concrete of different compositions for the construction of biological protection shields are reviewed. Although the article deals to a considerable extent with non-USSR practice, designs and layouts used and planned in the USSR are also discussed.

36. Extraction of Uranium From Solutions and Slurries

"Extraction of Uranium From Solutions and Slurries," by B. N. Laskorin, A. P. Zefirov, and D. I. Skorovarov; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, pp 519-529

Extraction processes are applied to an increasing extent in the treatment of raw materials. The high degree of selectivity in extraction and the liquid state of the extracting agents are advantageous factors which make extraction preferable to other processes.

The report gives data on the extraction of uranium from sulfuric acid, nitric acid, hydrochloric acid, and phosphoric acid solutions and slurries, i. e., those which are most frequently encountered in uranium hydrometallurgy. As extracting agents suitable for industrial application, esters of carboxylic acids and those of phosphoric and phosphinic acids are considered, as well as liquid (dissolved) cation-exchange and anion-exchange agents, which in a number of cases (for instance, in the extraction of uranium from cleared solutions), are of advantage as compared with solid ion-exchangers. A flow sheet for the extraction of uranium from thich ore slurries is given.

37. Book on Prospecting for Uranium

Metody Poiskov i Razvedki Mestorozhdeniy Urana (Methods of Prospecting for surveying Uranium Deposits), by D. Ya. Surazhskiy, unsigned review; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, p 591

This book published at Moscow by Atomizdat, 1960 (240 pages, price 8 rubles, 70 kopecks), is a systematic manual on one of the most important subdivisions of prospecting and surveying geology. It has been compiled on the basis of experience acquired in actual prospecting for and surveying of uranium deposits in the USSR and abroad. It describes general characteristics of industrially exploitable types of uranium deposits and considers the principal criteria to be followed in prospecting. Prospecting based on the surveying of areas in which radiation, gas, and salts can be detected are described, as well as methods for preliminary prospecting, detailed prospecting, and assaying of ores.

In the concluding part of the book, the principal criteria are given for the evaluation of uranium deposits from the standpoint of the possibilities of industrial exploitation. Special methods for calculating the available amounts of ore are expounded.

The book is designed to serve the needs of engineers, geologists, technicians, and students at geological prospecting and mining institutes.

38. Analysis of Radioactive Ores by the β-γ Method

Analiz Radioaktivnykh Rud β-γ Metodom (Analysis of Radioactive Ores by the β-γ Method), by Kh. B. Mezhiborskaya, V. L. Sashkin, and I. P. Shumilin, unsigned review; Moscow, Atomnaya Energiya, Vol 8, No 6, Jun 60, p 581

This book, published by Atomizdat at Moscow in 1960 (64 pages, price one ruble, 90 kopecks), deals with the radiometric analysis of samples of uranium and uranium-thorium ores that are in a state removed from radioactive decay equilibrium. The book discusses the theory of the β-γ method, the equipment used, the specific aspects of measuring the β and γ radiation of samples, and methods for determination of factors that enter into calculations and formulas. Recommendations are made in regard to the evaluation of the precision of analyses carried out by the β-γ method. Methods for the radiometric analysis of samples of complex radioactive ores are briefly described. This book will serve the needs of physicists and geophysicists active in the field of the analysis of radioactive ores. It may also be of use to students in related fields, who can use it as a textbook in studying radiometry.

39. Heat Capacities of UF_4

"Heat Capacities of UF_4 in the Temperature Range of 100-400°," by G. L. Gal'chenko, Yu. V. Gagarinskiy, and M. M. Popov (deceased); Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 7, Jul 60, p 1631

The heat capacities of anhydrous uranium tetrafluoride in the temperature range indicated were determined by a method that had been described earlier. The results obtained are reported.

40. Nature of Uranate Coordination Compounds

"The Nature of Uranate Coordination Compounds," by I. I. Chernyayev, V. A. Golovnya, and G. V. Ellert, Institute of General and Inorganic Chemistry imeni N. S. Kurnakov, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 7, Jul 60, pp 1481-1492

General relationships pertaining to the formation of uranate coordination compounds and the role played in the formation of such compounds by the uranyl ion are discussed.

41. Extraction of Nitric Acid With Diisoamyl Ester of Methylphosphonic Acid

"Extraction of Nitric Acid With Diisoamyl Ester of Methylphosphonic Acid," by A. S. Solovkin; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1345-1357

The extraction of nitric acid and water with undiluted diisoamyl ester of methylphosphonic acid and solutions of this ester in dibutyl ether, benzene, kerosene, and carbon tetrachloride was investigated. The composition of the coordination compounds formed by interaction between nitric acid, water, and the ester was studied. The mechanism of the extraction of nitric acid was investigated.

42. Extraction of Thorium and Zirconium in the Form of Intracomplex Compounds

"Extraction of Thorium and Zirconium in the Form of Intracomplex Compounds," by V. I. Kuznetsov and Fang Ming-e, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60 pp 1375-1382

Extraction of thorium and zirconium in the form of compounds that form as a result of the action of organic substances which are insoluble in water is difficult because of the formation of polynuclear oxy-oxo-ions by the elements being extracted. To prevent formation of these ions, one must use organic substances which are capable of interacting with thorium or zirconium at acidities of the solution that are as high as possible. Such substances are easily synthesized compounds which contain several nitro-groups.

Thorium can be quantitatively extracted from solutions with a pH higher than 1.5-2.5 by cyclohexanone solutions of many compounds obtained by the coupling of diazotized picramic acid or diazotized dinitroanaline with β-naphthol, salicylic acid, 8-hydroxyquinoline, or other phenols.

Zirconium at a pH higher than 3 is extracted quantitatively by cyclohexanone solutions of the azo-compounds obtained by coupling of diazotized picramic acid with β-naphthol or 5-bromo-8-hydroxyquinoline or by 2, 4-dinitro-4'-hydroxy-azobenzene-3' carboxylic acid dissolved in cyclohexanone.

43. Boron Isotope Exchange Between Boron Trifluoride and Its Anisole Complex

"The Kinetics of the Boron Isotope Exchange Between Boron Trifluoride and Its Anisole Complex," by G. M. Panchenkov, A. V. Makarov, and B. V. Rozynov, Chair of Physical Chemistry, Moscow State University; Moscow, Vestnik Moskovskogo Universiteta-Seriya Khimiya, Vol 15, No 3, May/Jun 60, pp 7-10

An apparatus is described in which the heterogeneous isotope exchange between a gas and a liquid can be investigated under conditions involving intensive agitation of both phases. By using the equipment described, it was established that equilibrium in the boron isotope exchange between boron trifluoride and the anisole complex of boron trifluoride is established very rapidly when the two phases are agitated, namely, within a few minutes. The limiting factor which determines the rate at which equilibrium is reached in the boron isotope exchange under the conditions described is not the velocity of the isotope exchange, but the rate of diffusion of gas into the film of the liquid, this being the slowest process. The data obtained on the kinetics of the reaction of isotope exchange are in agreement with the results published in 1958 by A. A. Palko, R. M. Healy, and L. J. Landau (cf Journal of Chemical Physics, Vol 28, p 214). The work done at Moscow University was completed in 1957.

44. Extraction of Nitric Acid, Perchloric Acid, and Uranyl Nitrate With Solutions of Tributyl Phosphate

"Investigation by the Isomolar Series Method of the Extraction of Nitric Acid, Perchloric Acid, and Uranyl Nitrate With Tributyl Phosphate Solutions," by V. V. Fomin, R. Ye. Kartushova, and Ye. P. Mayorova; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1337-1344

The method of isomolar series was applied for determining the composition of compounds formed by nitric acid, perchloric acid, and uranyl nitrate with tributyl phosphate dissolved in an organic solvent. It is concluded on the basis of the results obtained that if the concentration in the organic phase of the substance being extracted is taken as the characteristic being investigated, one can determine the composition of the solvate that is formed. If concentrated solutions are used, one must take into consideration the coefficients of activity of the substances in the aqueous and organic phases.

45. Investigation by the Isomolar Series Method of the Extraction of Nitric Acid

"Investigation by the Isomolar Series Method of the Extraction of Nitric Acid," by V. V. Fomin, R. N. Maslova, and L. L. Zaytseva; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1383-1384

In research carried out earlier, the method of isomolar series was applied for the investigation of the solvation of nitric and perchloric acids with tributyl phosphate (V. V. Fomin, R. Ye. Kartushova, and Ye. P. Mayorova, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1337-1344). In the work described in this instance, the same method was applied for the investigation of the solvation of nitric acid with dibutyl ether and hexyl alcohol. The results obtained are reported.

46. Behavior of Copper Nitrate During the Extraction of the Nitrates of Uranyl and Plutonium With Tributylphosphate Solutions

"Behavior of Copper Nitrate During the Extraction of the Nitrates of Uranyl and Plutonium With Tributylphosphate Solutions," by V. B. Shevchenko, I. V. Shilin, and Yu. F. Zhdanov; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1366-1374

In the extraction of copper nitrate with solutions of tributyl phosphate (TBP) in benzene, the distribution factor of copper nitrate increases with increased concentrations of TBP and with increased values of the ionic strength of the aqueous solution. If the concentration of copper nitrate in the aqueous solution is increased at constant concentrations of TBP and constant values of the ionic strength, the magnitude of the distribution factor of copper nitrate decreases. Presence of uranyl nitrate in the aqueous solution lowers the value of the distribution factor of copper nitrate, while the presence of aluminum nitrate added as a salting-out agent increases this value. From data obtained in the investigation of extraction of copper nitrate by TBP solutions and determination of solubilities of this salt in TBP, it follows that when benzene is used as the diluent, the composition of the compound extracted apparently corresponds to the simplest formula $Cu(NO_3)_2 \cdot 2TBP \cdot H_2O$. When kerosene is the diluent, the composition of the compound extracted corresponds to the formula $Cu(NO_3)_2 \cdot 3TBP \cdot 2H_2O$. The two compounds mentioned are stable only at temperatures higher than minus 10°.

47. Phosphate Coordination Compounds of Plutonium (IV)

"Determination by the Solubility Method of the Composition and Dissociation Constants of the Phosphate Complexes of Plutonium (IV)," by R. G. Denotkina, A. I. Moskvin, and V. B. Shevchenko; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 7, Jul 60, pp 1509-1515

The solubilities of disubstituted Pu (IV) phosphate in 2 M HNO_3 solutions in the presence of phosphoric acid of different concentrations were determined. It was found that the solubility of this phosphate increases with increasing concentrations of phosphoric acid because of the formation of complexes by Pu (IV) with phosphate ions. It was established that in these solutions, phosphate complexes with a ratio of metal to ligand = 1: 1; 1:2; 1: 3; 1: 4; and 1: 5 are formed. The concentration dissociation constants of these compounds were determined. The solubilities of $Pu(HPO_4)_2 \cdot x H_2O$ in aqueous solutions of phosphoric acid of different concentrations were also determined. By using a graphic method, it was established that in these solutions, phosphate complex ions with ratios of metal to ligand = 1: 3; 1: 4; and 1: 5 are formed.

48. Uranium Oxalate and Complex Uranium Oxalate Ions

"Solubility Product of Uranium (IV) Oxalate; Composition and Dissociation Constants of U (IV) Complex Oxalate Ions in Aqueous Solutions," by F. A. Zakharova and A. I. Moskvin, Institute of Physical Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1228-1233

The effect of the acidity on the soulbility of the oxalate of tetravalent uranium in hydrochloric acid was determined. Furthermore, the solubilities of uranium (IV) oxalate in solutions of ammonium oxalate of different concentrations in the presence of 0.5 mols of HCl were determined. On the data in regard to the solubilities of $U(C_2O_4)_2 \cdot 6H_2O$ in hydrochloric acid, its solubility product was calculated and found to be equal to $(4.3 \pm 0.4) \cdot 10^{-22}$. It was established by the solubility method that the complex ions $[U(C_2O_4)]^{2+}$, $[U(C_2O_4)_2]^{0}$, $[U(C_2O_4)_3]^{2-}$, and $[U(C_2O_4)_4]^{4-}$ are formed in oxalate solutions. The over-all concentration dissociation constants of these complex ions are 2.5×10^{-9}; 1.4×10^{-17}; 1.7×10^{-23}; and 5.7×10^{-28}, respectively.

49. Close Intergrowth of Nasturan (Uraninite) With Zirconium Minerals

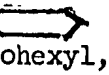
"On the Close Intergrowth of Nasturan (Uraninite With Zirconium Minerals," by V. I. Zhukova; Moscow, Atomnaya Energiya, Vol 9, No 1, Jul 60, pp 52-54

It was established that nasturan (uraninite) contains different amounts of zirconium and rare earths, depending on the quantity and type of zirconium minerals associated with them. The chemical composition of samples of nasturan intergrown with zirconium minerals and the physical properties of nasturans (uraninites) of this type have been investigated.

Organic Chemistry

50. Gamma-Alkoxypyridines

"Method for Producing Gamma-Alkoxypyridines," by A. F. Vompe and N. V. Monich; Moscow, Byulleten' Izobreteniy, No 6, 1960, p 19

Patent No 126884 has been issued to the above-named chemists for a method of producing gamma-alkoxypyridines with the general formula:  where R is an alkyl radical, for example, CH_3, C_2H_5, cyclohexyl, etc. This method is distinguished by the fact that gamma-phenoxypyridine is heated with the alcoholates of basic metals in the corresponding alcohols at 110-170°C.

51. Organophosphorus Semicarbazides

"1-Aryl-, 1-Benzoyl- and 1,1-Dimethyl-4-dichlorophosphinyl Semicarbazides and Their Derivatives," by A. V. Kirsanov and L. P. Zhuravleva, Institute of Organic Chemistry of the Academy of Sciences, UkSSR; Kiev, Dopovidi Akademii Nauk UkRSR, No 6, 1960, pp 804-808

The acid dichloride and diesters of isocyanatophosphoric acid unite at the isocyanate group of hydrazine, 1,1-dimethyl hydrazine, benzoyl hydrazine, and aryl hydrazine to form the respective derivatives of 1,6-bisphosphinyl hydrazoformamide, 1,1-dimethyl-4-phosphinylsemicarbazide, and 1-aryl-4-phosphinylsemicarbazides.

The structure of 1-benzoyl- and 1-aryl-4-dichlorophosphinylsemicarbazides, as well as 1,4-disubstituted semicarbazides, is indicated by the fact they yield the 1-benzoyl- and 1-aryl-semicarbazide on hydrolysis.

The structure of 1-benzoyl- and 1-aryl-4-dimethoxy (diphenoxy)-Phosphinylsemicarbazides is shown by their chemical properties and by the synthesis of 1-aryl-4-dimethoxyphosphinylsemicarbazides by the action of methanol on 1-aryl-4-dichlorophosphinylsemicarbazides.

52. Phosphorus Complex Compounds Formed

"Complexes of Phosphorus Pentachloride With Aryl- and Styryl-phosphorus Tetrachlorides," by A. V. Kirsanov and G. K. Fedorova, Institute of Organic Chemistry of Academy of Sciences, Ukrainian SSR; Kiev, Dopovidi Akademii Nauk UkRSS, No 6 1960, pp 801-803

When PCl_5 reacts with styrol at 0°C, the complex $C_6H_5CH{=}CHPCl_3^+ \cdot PCl_6^-$ is formed, not the product of combination as was earlier thought. It is quite probable that an intermediate product of the reaction is an unstable complex $(C_6H_5CH{=}CH_2PCl_4)^+ \cdot PCl_6^-$.

At 70° C, the $C_6H_5CH{=}CH\ PCl_3^+ \cdot PCl_3^-$ complex reacts with styrol to form styrylphosphorus tetrachloride.

The reaction between styrylphosphorus tetrachloride and sulfur dioxide yields the acid dichloride of styrylphosphinic acid. Complexes of the $RPCl_3^+ \cdot PCl_6^-$ type and compounds of the $RPCl_4$ type give $RPCl_2$ on reduction with red phosphorus.

When PCl_5 reacts with the acid dichloride of arylphosphinic acids, $ArPCl_3^+ \cdot PCl_6^-$ complexes are formed.

Radiation Chemistry

53. Copolymerization of Trifluorochloroethylene With Different Monomers

"Utilization of the Energy of Ionizing Radiation in the Process of Copolymerization of Trifluorochloroethylene With Different Monomers" by A. V. Fokin, Ye. V. Volkova, and A. D. Sorokin; Moscow, Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva imeni D. I. Mendeleyeva, Vol 5, No 1, May 60, p 120

The results obtained in the investigation described indicate that under the action of ionizing radiation, copolymerization of trifluorochloroethylene with vinylidene fluoride, tetrafluoroethylene, fluoropropylene, and ethylene oxide takes place, proceeded by a radical chain mechanism. The copolymerization processes take place with high radiation-chemical yields. The properties of the products obtained are described. It was found that some copolymers of trifluorochloroethylene with vinylidene fluoride exhibit a high degree of stability towards the action of solvents, oils, and nitric acid. Their properties are similar to those of the corresponding copolymers obtained with the use of peroxide initiators.

Radiochemistry

54. Application of Radioactive Isotopes for Measuring the Wetness of Steam

"Application of Radioactive Isotopes for Measuring the Wetness of Steam," by M. I. Korsunskiy, A. S. Lagunov, L. P. Bayvel', and A. N. Sinel'nikov; Moscow, Izmeritel'naya Tekhnika, No 5, May 60, pp 50-52

A procedure is proposed for determining the wetness of steam by measuring its density on the basis of absorption of beta-particles by it. In the work described, radioactive sulfur was used as the source of beta radiation.

53. Influence of the Nonequilibrium Quality of the Crystallization Process on the Behavior of a Trace Element

"The Influence of the Nonequilibrium Quality of the Crystallization Process on the Behavior of a Trace Element," by I. D. Ryabchikov, Chair of Geochemistry, Moscow State University; Moscow, Geokhimiya, No 4, May 60, pp 345-354

An equation is deduced which describes the behavior of a microcomponent in the crystallization process, taking into account that only partial equilibrium is established with regard to this microcomponent between the solution and the crystals precipitated earlier.

The possible influence of the presence of a concentration gradient on the behavior of the microcomponent is considered.

The frequency distribution of the microcomponent concentration in the crystallization products is discussed.

Miscellaneous

56. Hungarian Chemical Industry Research Institutes Described

"Statements by Leaders of Three Chemical Industry Research Institutes" (unsigned); Budapest; Nepszabadsag, 27 Jul 60, p 7.

Gyula Hardy, chief of the synthetic materials division of the Organic Chemical Industry and Synthetics Materials Research Institute (Szerves-vegyipari es Muanyagkutato Intezet), spoke to the reporter on the importance

of plastics and synthetic materials to Hungary. He said that research had been concentrated on three tasks. The first was introducing large-scale methods of production of polyvinyl chloride, polyethylene, and a nylon-type material called "danulon." Small experimental plants now produce all three materials. These plants have a yearly capacity of 100 tons, but equipment has been ordered from abroad with which several thousand tons can be produced yearly. The second task was a search for new types of synthetics, and the third was to find areas in which to use synthetics.

Gyula Horvath, deputy director of the Pharmaceutical Industry Research Institute (Gyogyszeripari Kutato Intezet), spoke of the new center being built for the institute in Ujpest, near the Chinoin Factory. The antibiotics research laboratory there will be ready in 1962, and the chemical research division and the directorate will move to the new center in 1964. In the 10 years of its operation, the institute developed the manufacturing technology for 70 preparations. Of these, Horvath mentioned the products "Chlorocid," "Tetran," "PAS" (used against tuberculosis), "Degranol" (used against blood and lymph system tumors such as leukemia), and the tranquilizer "Trioxazin." The institute is also seeking new antibiotics.

In Veszprem, Dr Gyorgy Koranyi, director of the Heavy Chemical Industry Research Institute (Nehezvegyipari Kutato Intezet), spoke of the research on synthetic fertilizers, coal processing, and anticorrosion techniques. New tasks for the institute include increased attention to protection of agricultural plants and work on automating chemical factories.

III. ELECTRONICS

Instruments and Equipment

57. Optical Method for Studying Dielectrics in Decimeter Band Described

"Measurement of Small Samples of Dielectric Materials in Free Space in the Decimeter Wave Range," by D. I. Mirovitskiy and V. F. Dubrovin; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 109-114

A compact laboratory apparatus for measuring the reflection factor and transmittance of dielectric materials in the decimeter wave band in free space is described. Construction of the apparatus was made possible by the use of dielectric rod antennas with circular cross-sections. Dimensions of the apparatus were reduced by using calcium titanate and strontium titanate ceramics in the receiving-transmitting antennas. The method developed by the authors may also be used in determining the concentration of electrons in a plasma and in the study of the properties of gases at high temperatures.

58. Short Duration X-Ray Bursts

"Some Achievements in Development of Sources for Short-Duration X-Ray Bursts," by D. M. Tarasov, A. A. Lukashev, N. A. Seleznev, and L. F. Sklizkova; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60, pp 118-121

The construction and performance of a new-type impulse generator to trigger a sharp-focused X-ray tube are described in the article. The 6GIN-500 impulse generator used in this experiment was designed for operation at voltages up to 1.6 Mv.

In this work, two kinds of impulse X-ray tubes with pointed anodes were tested: a sealed X-ray tube with glass insulator and a dismountable tube with organic glass insulator. During the experiment, the vacuum in the X-ray tubes was maintained at 10^{-5} mm Hg. A single impulse from the generator produced a burst of X-rays able to penetrate a 34-mm lead sheet placed at a distance of one meter from the tube.

It was shown that with the increase of capacitance of the impulse generator, a considerable gain in the intensity of the X-ray penetration is observed, especially with the sharp-focused two-electrode X-ray tubes. It was also shown that the increase of cathode diameter and the increase of the cathode-to-anode distance result in a decided increase of the intensity in the X-ray bursts.

The author thanks V. A. Tsukerman for assistance.

59. Ionic Tube Operating at 50 Kv

"Ionic Tube Operating at 50 Kv," by I. V. Orfanov and V. A. Teplyakov, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60 pp 150-152

For obtaining and accelerating gas ions, an ionic tube was designed operating at a potential of 50 kv and ionic current of 20 milliamp. A bifilar coil made of 0.8 mm tungsten wire formed the cathode. The ion-optical system consists of a single-potential electrostatic lens with retarding field. This lens is in the form of a separate unit, which simplifies its assembly and adjustment. The construction of the lens is such as to permit the adjustment of the distance between electrodes and between the source and trap electrode. The vacuum of about $4 \cdot 10^{-6}$ mm Hg is maintained by a diffusion pump with a water trap. The ions are generated with hydrogen admitted to the discharge chamber through nickel tubing. The hydrogen pressure in the source chamber can be varied from $2.6 \cdot 10^{-2}$ to $5.3 \cdot 10^{-2}$ mm Hg. The hydrogen consumption can be varied from 30 to 60 cm^3 per hr.

The ion current was measured at a collector placed 51 cm from the source by calorimetric and electric methods. The total ion current, for continuous operation, was about 21 milliamp when a current of 1.6 a was passing through the arc, and a magnetic field of 3,000 oersteds was impressed across the gap. The diameter of the ion beam was about 12 mm. The ion source could operate with great stability, for a period of over 9 hrs. The life of the tube was better than 500 hr.

The authors thank S. N. Popov and D. V. Karetnikov for assistance.

60. Magnetic Undulators

"Experimental Investigation of Electron Beam Passage Through Magnetic Undulator," by N. S. Zinchenko and I. K. Ovchinnikov, Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 1, Jan/Feb 60, pp 69-76

The article describes the construction of a magnetic undulator which can transmit through its full length a high-current electron beam. The tests with this undulator were carried out at the Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR.

The magnetic undulator comprises the following units: electron gun, accelerating diaphragm, magnetic focusing lens, magnetic undulator, and a collector. The electron gun produces a converging electron beam of circular cross section. The bariated-tungsten cathode is in the form of a cylinder filled with barium carbonate and is able to emit a pulse current of 180 a/cm^2. Additional focusing was obtained with the aid of a short magnetic lens having a magnetic field of 400 oersteds. The magnetic undulator consisted of a series of magnets producing a field of alternating polarity. The magnets were placed along the axis of the beam in such a manner that their fields were perpendicular to the axis and were periodically changing their direction. The passage of the electron beam was studied with three undulators of 12, 7, 6, and 6.8 mm in length.

Testing has shown that magnetic undulators of the proposed construction assure easy transit of a large current beam over a considerable length. It is also pointed out that with the aid of such magnetic undulators, it is possible to generate short wave oscillations.

The authors thank A. Ya. Usikov, corresponding member of the Academy of Sciences Ukrainian SSR, for his assistance.

61. Gamma-Radiation Stabilizer

"Betatron Gamma-Radiation Stabilizer," by Ye. M. Belov and V. N. Titov, Tomsk Polytechnic Institute; Kiev, Izvestiya Vysshikh Uchebnykh Zavedeniy, Radiotekhnika, No 1, Jan/Feb 60, pp 94-99

The article describes the construction and performance of a gamma-radiation stabilizer for a betatron based on the principle of automatic phase adjustment of the injection pulse. This stabilizer permits almost instantaneous follow-up of the intensity of radiation, which is maintained at 95-97% of the maximum possible value under the existing destabilizing factors, especially those due to the power-line voltage fluctuation.

The gamma-radiation stabilizer consists of the following components: the extension unit, two-stage voltage amplifier, amplitude discriminator, integrating circuit, amplifier-phase inverter, power amplifer, search circuit, cathode follower, and follow-up multivibrator. The application of the suggested system for stabilizing radiation intensity is recommended for betatrons able to accelerate particles up to 15-25 Mev.

The author points out one of the shortcomings of the suggested system--the need for manual adjustment of the radiation intensity when the power supply voltage drops below the normal value.

At the present time, the authors are working to develop an optimizing regulator of radiation intensity based on the principle of automatic adjustment of the phase of the injection pulse.

62. Laboratory Generator for Short Pulses Described

"Generator for Short-Duration Pulses," by O. S. Kolotov, Yu. N. Lobanov, A. S. Obykhov, and N. M. Polev, Scientific Research Institute of Nuclear Physics, Moscow State University; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 73-76

The circuit of a generator designed to produce pulses with a duration of 10^{-9} seconds and less is described. The method used involves the discharge of a shaping line through a resistance connected to the line by means of a commutating device. A low-voltage thyratron TGII-3/1 with subsequent amplification of the pulse by vacuum tubes is used.

With a load of 75 ohms, the generator is capable of forming negative pulses with an amplitude of > 1 kv and duration of $< 4 \cdot 10^{-9}$ seconds and positive pulses with an amplitude of up to one kv and a duration of $\sim 5 \cdot 10^{-9}$ seconds.

The generator was used in an experimental study of electron capture as the source of pulses for a betatron injector.

The authors express their appreciation to A. A. Sanin for his assistance.

63. Electronic Device Described for Analyzing Recorded Functions

"Spectrum Analyzer With Electronic Functional Converter," by M. G. Serbulenko and V. M. Matoshin, Institute of Geology and Geophysics of the Siberian Department of the Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 84-86

A spectrum analyzer for obtaining amplitude-frequency characteristics of arbitrary limited functions is described. The functions, in the form of a graph, are cut from opaque paper and introduced into a heterodyne analyzer by an electronic functional converter. The time required for a complete analysis is approximately 30 minutes when an electronic integrator is used at the output and approximately 8 minutes when visual observation of an oscillograph screen is used. Error of the analyzer in the first case is 3-5%, and in the second case, 5-7%.

64. Accurate Electrodynamic Multiplier Described

"Investigation of an Electrodynamic Multiplication Device," by Yu. L. Kurkin, N. S. Kurkina, R. D. Matsonashvili, A. N. Shumskiy, and S. T. Shumskaya; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 82-84

A description is given of the operation of an electrodynamic multiplication device used for multiplying two voltages with frequencies of 0-0.5 cycles and amplitudes of 0-100 volts, as well as for division of the products of these values by a voltage with a value of 20-100 volts. Accuracy of multiplication is $1 \cdot 10^{-3}$ of the maximum value. The possibility of using the instrument for performing operations of square root extraction is pointed out, and certain design recommendations are made.

65. Particle Injector for Accelerators

"Injector for Electron Accelerators," by I. M. Samoylov; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60, pp 21-23

The construction and performance of an experimental electron injector able to produce a practically parallel electron beam, in which almost 90% of the particles are enclosed in a + 2° angle, are described. The angle of divergence of the electron beam, however, can be enlarged to 20° with proper variation of the potential at the control electrode. The anode of the injector was executed in the form of a dismountable unit. The cathode was in the form of a 0.1 X 1.0 X 24-mm tungsten ribbon, and the control electrode, in the form of 0.3-mm thick tantalum sheet.

The electron-optical characteristic of the system was such as to permit the adjustment of the electron beam width within the limits of $\sim 2°$-$20°$.

Tests have shown that the electrodes of the injector can withstand a potential up to 75 kv for a duration of 6 microsec. The heating of the tungsten cathode requires power of 50 w; the life of the cathode is about 100 hours. This injector was tested on a 15 Mev betatron.

It was also found that lanthanum-boride (LaB_6)-coated cathodes are suitable for this type of operation.

The author thanks A. A. Mikryukov and A. I. Kondrakhin for assistance in this work.

66. Counter Records at Slow Pulse Rates

"Instrument for Automatically Recording the Number of Pulses at Low Counter Rates," by A. M. Netsetskiy and O. I. Sumbayev, Physico-Technical Institute of the Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 93-95

An instrument is described which automatically records the number of pulses during a counter interval regardless of the slowness of the counter rate. The instrument is transistorized and operates in a manner similar to one variation of the multiposition switches with code control used in computers. During the counter interval, pulses are stored by binary cells connected as in the ordinary scaler circuit.

The instrument operates cyclically. One cycle consists of a counting interval, a recording interval, and clearing. During the counting interval, pulses are stored in the scaler circuit. Counting stops in the recording interval, and the recorder is switched on at the output of the instrument. The recorder is then disconnected, and the counter is cleared.

Total recording error does not exceed 1-2%.

67. Blanking of Photomultiplier With Short Pulse

"Blanking of Photomultiplier With Microsecond Pulses," by A. N. Volkov, A. M. Klabukov, and Yu. P. Popov, Physics Institute, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60, pp 68-71

The experiment aimed to establish the possibility of blanking various Soviet manufactured photomultipliers with flat-shaped microsecond pulses followed by speedy restoration of their full efficiency. The conditions were selected for complete blanking of the FEU-19M and FEU-29 photomultipliers with about 40-v pulses, subsequent restoration of full detector efficiency within an interval of one microsecond. Blanking tests with the FEU-12 type photomultiplier showed that it does not possess a sufficiently high recovery rate.

The described method of blanking by microsecond pulses may be utilized in investigation of short-period isomers, as well as other processes following powerful bursts of radiation.

The authors thank F. L. Shapiro, I. V. Shtranikh, A. I. Okorokov, and Ye. D. Bulatov for their assistance.

68. Low-Frequency Selective Amplifier

"Low-Frequency Selective Amplifier With Narrow Square Frequency Response," by Ye. V. Kuchis, Institute of Physics and Mathematics, Academy of Sciences Lithuanian SSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60, pp 74-76

The article describes the construction and operating characteristics of a narrow-band, low-frequency amplifier designed at the Institute of Physics and Mathematics, Academy of Sciences Lithuanian SSR.

This amplifier consists of three identical selective amplifying stages with their pass-bands somewhat staggered with respect to each other. Each stage is built on the principle of a cascode circuit, which permits high amplification. The amplification factor of an individual stage is 300, and of the whole amplifier, $5 \cdot 10^6$. Outside the operating frequency band, the frequency response curve has a steep drop, so that the amplification decreases 10 times for a deviation of 0.5 cps and about 100 times for a deviation of 1.3 cps. Nonuniformity in amplification within the operating frequency band (19.5 to 20.5 cps) does not exceed 3%. The maximum undistorted output amplitude is about 60 v. Amplifier noise, with shorted output, is about 10^{-7}v. The plate power requirement is about 5 milliamp.

The described amplifier was used to measure Hall's emf in film semiconductors.

The author thanks V. Tolutis for his assistance.

69. Infrared Spectropyrometer Designed for Accurate Measurements

"Spectropyrometer for Measuring Temperature by Monochromatic Infrared Radiation," by V. Ye. Finkel'shteyn and N. G. Starunov, Khar'kov State Institute of Measurements and Measuring Instruments; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 122-125

An infrared spectropyrometer IKP-57, which operates on the zero modulation principle, was designed for making accurate measurements of temperatures in a range of 400-1000°C and for use as a calibration instrument in work on reproducing the International Temperature Scale. The radiation receiver serves as an indicator of the equality of continuously compared brightnesses of a hot body and the comparison lamp. The light is analyzed by a prism infrared monochromator; the effective wavelength may be changed from 0.5 to 2.4 microns. In measuring the temperature of objects with dimensions of 1x1 mm^2, instrument errors in the interval of 400-1000°C do not exceed 1.0-0.4°C.

70. Phase Detector for Light Range Finder Developed

"Modulation Phase Detector Using a Mixer Tube," by Yu. V. Popov, State Optical Institute; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 77-81

The principle of operation and characteristics of a modulation phase detector using a mixer tube are described. The detector requires practically no tuning and, having a high sensitivity, has satisfactory amplitude-phase characteristics up to frequencies of 10-12 Mc. The detector is used in the phase light range-finder of the State Optical Institute.

Essentially, operation of the detector involves feeding one of the compared voltages to the control grid of the mixer tube and the second voltage to the heterodyne grid. The anode current of the tube will then depend on the difference between the phases of the compared voltages. A phase modulator is used to periodically change the phase of one of the voltages by 180°.

The author acknowledges the assistance of A. I. Chashchina and K. K. Yarmarkin.

71. Phase Meter Developed With Extended Frequency Range

"Broadband Phase Meter With Direct Reading," by V. P. Volodin and Yu. N. Polyakov, Leningrad Polytechnic Institute; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 89-90

A method is developed by the authors for shaping the trigger pulses of a phase meter which simplifies the circuit of the instrument and extends the operating frequency range to 250-10^5 cycles.

The compared sinusoidal voltages enter two identical channels, where they are converted to short voltage pulses. A miniature peak transformer with a toroidal ferrite core is the basic element of each channel. The primary winding of the transformer is connected to the anode circuit of a power amplifier, and a capacitor, connected in series with the winding, eliminates magnetization of the core by the direct component of the anode current. Preamplifiers in each channel permit operation with input signals of one volt or less.

72. Investigation of Nuclear Magnetic Resonance

"Spectrometer for Investigation of Nuclear Magnetic Resonance in Crystals," by A. G. Lundin and G. M. Mikhaylov, Institute of Physics, Siberian Branch, Academy of Sciences USSR; Moscow, Pribory i Tekhnika Eksperimenta, No 2, Mar/Apr 60, pp 90-92

In investigation of the spectrum of nuclear magnetic resonance of crystals, it is important to register such spectra for various orientations of the dc magnetic field with respect to the crystal axis. A spectrometer was designed with a rotating magnetic field for the convenience of examining crystals which are kept in special containers at very low temperatures. This spectrometer incorporates a pi-shaped magnet with field nonuniformity of 0.03 oersted per cubic centimeter, an autodyne oscillator with a high transcunductance tube, a narrow-band amplifier, and a phase detector. The weight of the magnet with a winding of 20,000 turns is about 500 kg. When a current of 600 milliamp flows in the winding, a magnetic field of 4,500 oersteds is built up in the gap. The spectra are registered by a self-recording potentiometer EPP-09.

The spectrometer was tested on crystals containing hydrogen and fluorine. The working range of the spectrometer with a set of plug-in coils is 1-20 Mc. The resolving power for hydrogen in a field of 3,000 oersteds is about 130 cps.

73. Observation of Electron Paramagnetic Resonance

"Generator for Observation of Electron Paramagnetic Resonance." by A. V. Kubarev and Yu. A. Mezenev, Sverdlovsk Affiliate of the All-Union Scientific Research Institute of Metrology; Moscow, Pribory i Tekhnika Experimenta, No 2, Mar/Apr 60, pp 86-89

The article gives a description of an improved version of a regenerative detector with capacitive coupling which is very efficient for observation of electron paramagnetic resonance in the range of weak magnetic fields. This positive feedback oscillator with grid current can be utilized in the frequency range from a fraction of one megacycle to 125 Mc, i.e., in the range of weak magnetic fields. During the observation of electron paramagnetic resonance, the predominant effect is due to the reaction of energy absorption in the circuit in an amount close to the grid current, which in turn leads to increased sensitivity and a specific relationship of resonance to the level of the high-frequency oscillations. Due to the high sensitivity and high value of signal-to-noise ratio, it was possible to measure the field intensities in the range of one oersted and higher with an error of less than 0.05%.

α α -diphenyl-β -picryl-hydrazl was used as a free-radical sample to help in displaying the dependence of amplitude of the resonance signal on the level of high-frequency oscillations. The total frequency range of 1.35-40 Mc was secured with the aid of three plug-in coils of 16.3, 8.3, and 0.89 microhenry.

The instrument has provisions for extending the range of its measurements up to fairly high intensity fields and for observation of nuclear magnetic resonance.

Materials

74. Properties of Improved Silver Sulfide Photoelements Described

"Certain Characteristics of Silver Sulfide Photoelements FESSU," by V. Ye. Kosenko and Ye. G. Miselyuk, Institute of Physics, Academy of Sciences Ukrainian SSR; Moscow, Pribory i Tekhnika Eksperimenta, No 3, May/Jun 60, pp 127-130

The article presents some of the characteristics of "improved silver sulfide photoelements" (FESSU). These include integral sensitivity, luxampere and frequency characteristics, internal resistance, output power and efficiency, and temperature coefficient and its relationship to illuminance and external load. It is noted that, although the technology of manufacturing silver sulfide photoelements has improved to a great extent in recent years, certain properties, such as luxampere characteristics, have remained practically unchanged since their introduction.

75. USSR Work on Organic Semiconductors and Other Organic Substances With Special Electric and Magnetic Properties

"Organic Polymers Exhibiting Electric and Magnetic Properties," by V.D. Bityukov; Moscow, Vestnik Akademii Nauk SSSR, Vol 30, No 7, Jul 60, pp 99-100

"During recent years, successful work has been conducted in the USSR on the synthesis of polymers possessing conjugated bonds and heteroatoms in the conjugation chain with the purpose of developing polymerized materials which exhibit novel electric and magnetic properties. The properties in question are often referred to as semiconductor characteristics, which does not mean that they are identical to or equivalent with the properties of genuine semiconductors such as germanium or silicon. When the

structure of a polymer is sufficiently regular so that a conjugated system of the type mentioned is present, particularly a system which contains in its molecular chains atoms with electrons that are in outer shells and do not participate in chemical bonds (e.g., nitrogen atoms), current carriers may easily arise in such a polymer. It is possible at present to produce a sufficient degree of regularity in the polymers in question, so that the electrical and magnetic properties of the materials synthesized can be varied within a wide range. The Institute of Electrochemistry, Academy of Sciences USSR, has conducted a conference on work in this field. The purpose of the conference, which was held on 21-22 January 1960, was to correlate the results obtained and coordinate work on the subject to be conducted in the future at institutes of the Academy of Sciences USSR.

"Particular attention was paid to problems involved in the synthesis of a number of new types of polymers exhibiting a wide range of electric and magnetic characteristics and also a high resistance to heat. The polymers referred to were discussed in a report by A.A. Berlin. The polymers with the properties mentioned comprise, first of all, those with carbon-carbon chains having conjugated bonds; polymers with conjugated bonds containing heteroatoms and polar groups and also complexes of the latter with metals; and finally chelate polymeric compounds formed by percyanoethylene with metals.

"Investigation of the electrical properties of the types of polymers enumerated, as reported in a paper by V.L. Tal'roze, showed that the energy of activation of the electrical conductivity lies within the range of 4-49 kilocalories per mol (this corresponds to exponential coefficients within the range of 10^{-8} - 10^{18} ohm $^{-1}$. cm^{-1}). The highest values of the exponential coefficients and of the energies of activation (10^{11} - 10^{18} ohm^{-1} . cm^{-1} ; 40-50 kilocalories per mol) are exhibited by polyphenylacetylenes. This circumstance is of considerable interest because it is very likely that polymers of this type, which exhibit a high conductivity at a temperature of around 200° and a high degree of dependence of the conductivity on the temperature, will be used for practical applications. It was found that high-molecular materials exhibit a steep rise (flashout) of electrical conductivity at elevated temperatures because of the recombination of radicals formed as a result of exposure to ionizing radiation or in consequence of polymerization.

"The polymeric coordination compounds of percyanoethylene which have been synthesized exhibit, as has been established in research conducted by A.A. Berlin and L.I. Boguslavskiy, a high heat resistance (up to 450°) at metal surfaces, an appreciable electrical conductivity amounting to 10^{-7} - 10^{-5} $ohm^{-1} \cdot cm^{-1}$, and an energy of the activation of electrical conductivity amounting to 5-7 kilocalories per mol.

"The magnetic characteristics of the novel polymers were investigated in work done by L.A. Blyumenfel'd. Two principal magnetic effects were detected. One of them is connected with the presence of narrow (ΔH = 5 - 8 oersted) lines of electronic paramagnetic resonance, which characterize the properties of individual molecules and also the degree of conjugation. The most highly conjugated systems were found to contain 3 - 5 x 10's unpaired electrons per one gram of substance. This effect is regarded as a consequence of a definite degree of absence of pairing between π-electrons and conjugated double bonds, rather than a phenomenon due to the presence of free radicals. It was established that this effect has no direct relation to the electrical properties of the polymers investigated. The second effect consists in the fact that a number of solid polymers (for instance, polyaminoquinone and percyanoethylene polymer) exhibit anomolous magnetic properties, namely, broad lines of electronic paramagnetic resonance (Δ = 500 - 1000 oersted) of a high intensity. These polymers also exhibit a high positive static magnetic susceptibility. It was established in connection with this that the magnetic susceptibility is due only to the structure of the solid samples being examined, not to that of individual molecules. To some extent, this susceptibility is analogous to corresponding properties of ferrites.

"Particular interest was evinced toward communications made by B.A. Krentsel', L.S. Polak, and B.E. Davydov concerning results obtained in the investigation of products of the thermal transformation of polyacrylonitrile and also of products of the polycondensation of phthalic anhydride with hydroquinone and paraphenylenediamine. The polymer materials which were obtained have a specific conductivity ranging from 10^{-9} to 10^{-3} $ohm^{-1} \cdot cm^{-1}$, an energy activation of 0.3 - 0.9 ev, and a thermal electromotive force of 80-300 mv/° C. Changes of electrical and magnetic properties, spectra of electromic/paramagnetic resonance, and infrared spectra of semiconductor polymeric materials were studied in order to establish the dependence of these properties on the method of synthesis, the impurities that were introduced, and the action of γ and β- radiation.

"New types of polymers with conjugated double bonds were synthesized on the basisof β- chlorovinyl ketones, intracomplex high-molecular compounds, and bis- β- diketones. Polymers derived from phosphonitrilic chloride and ferrocene were also synthesized (A.M. Sladkov and M.I. Rybinskaya).

"A communication by V.G. Levich dealt with the calculation of the motion of a quasifree electron in a monodimentional chain of atoms which are subjected to thermal oscillations.

"Of interest was a communication by S.T. Levin on the electrical and magnetic properties of systems consisting of iron powder and polyisoprene, or some other polymer. It was established that the specific conductivity of these systems changes from tens of ohms to tenth fractions of an ohm within the temperature range from minus 50° to plus 100°. Depending on the method by which the polymer is introduced into the system, properties corresponding to either p-conductivity or n-conductivity are observed.

"Some transitional forms of carbon exhibit semiconductor properties. A thermocouple for measuring temperatures up to 3,000° was designed on this basis by V.I. Kasatchkin.

"The conductivity of polymers was found to increase after irradiation with fast electrons or X-rays. The increased conductivity is retained for long periods of time (N.A. Bakh).

"The conference noted that the principal directions in the investigation of electrical and magnetic properties of polymers have been defined with a sufficient degree of precision at the institutes which are engaged in work along these lines and that a sufficient degree of specialization in this field has been attained.

"The value of contacts between institutes and of cooperation in conducting work in this field, mainly by the institutes of Organoelemental Compounds, Electrochemistry, Chemical Physics, Petrochemical Synthesis, and Semiconductors, was emphasized. In closing the conference, A.N. Frumkin stated that the considerable advances which have been made in developing methods of synthesis and in investigating the properties of polymers exhibiting novel electric and magnetic properties make it possible to begin the investigation of ways in which materials of this type can be utilized from the practical standpoint, specifically so far as measurement of extremely high temperatures and employment of the new materials in the construction of thermistors are concerned."

76. Production of Large Solid Plastic Scintillators

"Production of Large Plastic Scintillators," by M.M. Koton, K.A. Sivograkova, Z.D. Tolstikova, and Ye. N. Yeremina; Moscow, Plasticheskiye Massy, No 2, Mar 60, pp 48-52

Scintillators consisting of plastics are of advantage as compared with single crystals of inorganic and organic substances or liquid scintillators because crystal scintillators are limited with respect size, whereas liquid scintillators are combustible, toxic, and must be kept in tight containers to prevent spillage.

Industrial methods have been developed for the production of scintillators based on polystyrene. These can be produced in the form of blocks weighing up to 10 kilograms and having a diameter of 220 millimeters and a height of 300 millimeters. Polystyrene scintillating material can also be produced in the form of a film having a thickness of approximately 100 μ. To produce scintillator blocks, a process of rapid polymerization is applied. Polymerization is carried out at 200°, i.e., at a temperature higher than that of the solidification of the polymer. The scintillator film is produced by extrusion followed by stretching at an elevated temperature to bring about orientation of the molecules, so that the strength of the film will be increased.

To produce the scintillator material, styrene which contains 2% by weight of p-terphenyl and 0.02% by weight of 1,4-di-2.5-phenyloxaizolyl-benzene is used. Designs have been developed for glass and metal molds in which the scintillators are produced. It was established that units weighing up to one kilogram can be conveniently produced in glass molds, while heavier units should be polymerized in metal molds. A polytetrafluoroethylene coating for the metal molds has been developed. Procedures for the purification of the styrene and the control of its purity on the basis of measurements of optical density have also been developed. An organosilicon heat-transfer agent (siloxane liquid No 5) has been found preferable to mineral oil heat-transfer agents in the heating of the molds.

77. Semiconductor Properties of Lead Selenide

"Investigation of Methods for the Preparation of Lead Selenide and of Its Semiconductor Properties," by N.I. Glistenko and A.A. Yeremina, Voronezh State University; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 5, May 60, pp 1003-1005

Methods of preparing lead selenide from difficultly soluble lead salts in heterogeneous (solid-liquid) media have been investigated. A method has been developed for synthesizing lead selenide by the

interaction of lead acetate with sodium selenosulfate to form lead selenosulfate. The latter is hydrolyzed with water with the result that lead selenide and sulfuric acid are formed. The sodium selenosulfate is prepared by boiling selenium powder with a concentrated sodium sulphite solution. Samples of lead selenide have been subjected to X-ray structural analysis. The following semiconductor characteristics of lead selenide samples prepared by different methods have been determined: specific resistance, conductivity as a function of the temperature, and the width of the forbidden zone.

78. Zirconium Dioxide - Titanium Dioxide Solid Solutions

"Supplementary Data on Solid Solutions in the System ZrO_2 -TiO_2," by E.K. Keler and A.B. Andreyeva, Institute of Silicate Chemistry, Academy of Sciences USSR; Moscow, Ogneupory, Vol 25, No 7, Jul 60, pp 320-324.

Data obtained in the work described confirmed that the compound $ZrTiO_4$ and two types of solid solutions form in the system ZrO -TiO_2. The interaction between zirconium dioxide and titanium dioxide begins at 1200° after the mixture has been kept at this temperature for 30 hours. The properties of the solid solution which form have been investigated and are described. It was found that solid solutions of the rutile type and also the compound $ZrTiO_4$ exhibit a uniform expansion and, notwithstanding the high porosity which they retain up to 1700°, are suitable for practical applications.

Materials consisting of zirconium dioxide and titanium dioxide are used as dielectrics.

79. System BaO -TiO_2 -ZrO_2

"Interaction of Barium Carbonate With Titanium Dioxide and Zirconium Dioxide on Heating," by N.B. Karpenko and A.K. Keler, Institute of Silicate Chemistry, Academy of Sciences USSR; Moscow, Zhurnal Neorganicheskoy Khimii, Vol 5, No 6, Jun 60, pp 1267-1282

Within the system BaO-TiO_2 -ZrO_2, the phase interrelationships in the systems $BaZrO_3$ / TiO_2 and $BaTiO_3$ / ZrO_2 were investigated in the temperature range of 1200-1600°. It was established that the nature of the

interaction between oxides of the system in question varies, depending on the temperature and on the composition of the initial mixture. The principal reaction which determines the character of the other processes that take place in the system is formation of the solid solution $BaTiO_3$ - $Ba ZrO_3$. This solid solution forms at a sufficiently high rate only above 1200°. The nature and composition of the components which do not enter into the solid solution have been investigated and are described.

The constitutional diagrams that have been constructed will presumably be of use in research on processes taking place in connection with the production of electroceramic materials based on barium titanate and analogous compounds.

IV. ENGINEERING

Automatic Control Engineering

80. Control Processes for Bounded Phase Coordinates

"Optimal Processes of Control for Bounded Phase Coordinates," by R. V. Gamkrelidze, Mathematics Institute imeni V. A. Steklov, Academy of Sciences, USSR; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 24, No 3, May/Jun 60, pp 315-356

Optimal processes of control for bounded phase coordinates are investigated, and equations are derived for the extremals for the corresponding variation problem.

81. Problem From the Theory of Finite Automatic Machines Solved

"Solution of One Problem From the Theory of Finite Automatic Machines," by A. A. Karatsuba; Moscow, Uspekhi Matematicheskikh Nauk, Vol 15, No 3 (93), May/Jun 60, pp 157-159

One of the problems presented by Mur, "Speculative Experiments With Sequential Machines," Sb statey "Avtomaty", 1956, is completely solved in the present work. All of the terms employed here are defined in the work mentioned above. The solution of the problem consists of the proof of the following two theorems:

Theorem 1. If S is an (n, m, p) machine with pair-wise distinct conditions, then there exists a branching trial of length not greater than $\frac{(n-1)(n-2)}{2} + 1$, with the help of which it is possible to define condition S at the end of the experiment.

Theorem 2. There exists an (n, m, p) machine, with pair-wise distinct conditions, such that the length of the shortest experiment which establishes the conditions of the machine at the end of the experiment is equal to $\frac{(n-1)(n-2)}{2} + 1$.

82. Stabilization and the Equation of Heat Conductivity

"On the Stabilization of a Solution for the Equation of Heat Conductivity," by V. M. Polyakova; Moscow, Doklady Akademii Nauk SSSR, Vol 129, No 6, Dec 59, pp 1230-1233

S. D. Eydel'man obtained a series of results on the problem concerning the stabilization of the solutions of parabolic systems (see S. D. Eydel'man, DAN, Vol 115, No 2, 1957), but the method employed by him, based on the investigation of a Green matrix, is convenient only for problems with constant coefficients. The problem for the case of variable coefficients was also presented by him.

In the present work, a theorem is proved which is an answer to the latter problem mentioned above for one self-conjugate equation having one space variable.

83. Hungarian Research in Ion Exchange Resins

"A Visit to the Thermal Technology Research Institute" (unsigned article); Budapest, Muszaki Elet, 23 Jun 60, p 6

The article notes that in 1952, the water chemistry laboratory of the Thermal Technology Research Institute (Hotechnikai Kutatointezet) developed ion exchange equipment which could produce water containing 10-0.1 milligrams of dissolved salt per liter, depending on requirements. Such equipment has been installed in a number of Hungarian power plants ("in Kelenfold, Ajka, Tiszapalkonya, etc."), and ion exchange desalinating equipment is also used by the United Incandescent (Egyesult Izzo) and the Kobanya Pharmaceutical factories.

The research laboratory is continuing work to perfect this equipment, reducing the quantities of chemicals consumed, and experimenting with "mixed bed" exchangers which use a common container for both cation and anion exchange resins. In cooperation with the Synthetics Industry Research Institute (Muanyagipari Kutatointezet) and the Medicolor plant in Fuzfo, domestic production of ion exchange resins has begun; Hungary now produces suitable quality cation exchangers and weak and strong base anion exchangers. "This opens up the possibility for exporting this equipment," the article comments.

The general thermal technology department of the Thermal Technology Research Institute is working on additional applications of the "small rib" heat exchangers which were used on the Heller-Forgo air condensing equipment exhibited at the Brussels fair in 1958. These heat exchangers will be used for cooling electric generators and large capacity electric motors and can be adapted for use on diesel motors as well.

Machine Building

84. Modeling Combustion Chambers of Gas-Turbine Engines

"On Modeling the Combustion Chambers of Gas-Turbine Engines," by B. P. Lebedev, Moscow Higher Technical School; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 177-188

Modeling considerations are discussed for forced-air combustion chambers of gas-turbine engines operating on kerosene. Results are reported of experiments conducted on four combustion chambers of similar geometry. Approximate conditions of simulation are defined which will guarantee invariable operating indexes and identical behavior of the characteristics of the chambers. Other conditions being equal, the main condition for the modeling of combustion chambers is the invariability of the ratio of the "effective combustion time" to the time during which the mixture remains in the combustion chamber.

85. Future Development of Gas Turbine Construction

"Possible Means of Developing Gas Turbine Construction," by V. V. Uvarov, Moscow State University; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 3-18

A general analysis of gas turbine design and ratings includes a comparison of Soviet GT-12-3 and GT-25 installations (Leningrad Metallurgical Plant) with well-known US, Swiss, English, and French counterparts with respect to certain data. On the basis of the discussions, the following four possible directions are cited for future development of gas turbines: (1) improvement of the cooling of working parts and transition to higher temperatures and higher pressures; (2) transition to intermediate cooling simultaneous with intermediate heating, particularly for gaseous fuel; (3) improvement of the hydraulics of the machine, particularly of the auxiliary elements; and (4) finding the most rational configuration for heat exchangers.

86. Reducing Flame-Tube Temperatures in Gas-Turbine Engines

"On Reducing the Temperature of the Flame Tubes of Gas-Turbine Engines," by A. A. Chirkov, Yaroslavl Technological Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 196-207

Design configurations are discussed for high-temperature combustion chambers of gas-turbine engines. A chamber variation is discussed, which has a ribbed flame tube and reduced degree of blackness of the internal walls. Some results of calculation in this direction are also given.

87. Air-Cooling of Gas-Turbine Rotors

"Some Results of a Study of Air-Cooling of Gas-Turbine Rotors," by I. T. Shvets and Ye. P. Dyban, Institute of Heat Engineering, Academy of Sciences Ukrainian SSR; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 167-176

A brief analysis is given of air-cooling of gas-turbine rotors. Results are given of a laboratory study of air-cooling by forcing air through the clearances of the assembled blade locks.

88. Computing Stage of Gas Turbine With Pulsed Combustion

"On the Problem of Computing a Stage of a Gas Turbine Unit With Periodic Combustion in the Chambers," by V. I. Lokay, Kazan Aviation Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 145-158

Certain problems are considered which arise in the design and choice of parameters of gas turbine installations with periodic combustion in the chambers. Formulas are derived for determining the efficiency of the pulsating stage and the optimal relationship of peripheral velocity and gas velocity.

With the periodic-combustion system, it is wise to use multistage turbines because of the considerable heat transfers.

The first pulsating stage can be designed as an active /impulse/ type stage or as slightly reactive, in order to improve the aerodynamics of flow within the stage. A tapered nozzle should be used in the pulsating stage. To guarantee effective operation of a pulsating stage, the geometry of the entrance buckets should comply with the angle of exit flow at the rotor stage during initial flow.

89. Computing the Velocity in the Rotor Wheel of a Radial Turbine

"Computing Velocities in Rotor Wheels of Radial Turbines," by A. N. Sherstyuk, Moscow Power Engineering Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 124-133

An approximation method is presented for determining velocities in interblade ducts of radial compressors and turbines. The method is based on a procedure developed by the author for computing curvilinear ducts.

90. Rotor Design Configurations for Radial Turbines

"On the Problem of Configuration Design of the Rotor Wheel of Radial Turbines," by A. I. Loshkarev, Moscow Higher Technical School; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 111-123

The three-dimensional problem of flow in a rotor wheel is reduced to a one-dimensional problem through the introduction of a natural system of coordinates associated with a "flow surface" in the relative motion and the line of flow on this surface.

An analysis is made of the flow of a liquid in the wheel on the basis of wheel geometry. The choice of wheel configuration to guarantee satisfactory velocity distribution along the interblade duct is also considered.

91. 1957 Research on Partial Turbine at Moscow Aviation Institute

"Selecting the Parameters of a Partial Gas Turbine and the Effect of the Degree of Partiality on Its Characteristics," by N. N. Bykov, O. N. Yemin, and B. A. Cherkasov, Moscow Aviation Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 98-110

The article describes results of 1957 research on the problem of finding the optimum values of partiality and blade height for the designing of low-power gas turbines. The study revealed the importance of the effect of selected parameters on both the efficiency of the turbine and on the type of vibrations of the blades, i.e., on the stability of the turbine. An analysis of the findings also revealed the importance of selecting the proper relationship between the computed degree of partiality and the blade height, the optimum relationship depending primarily on leakages resulting from variation of the two parameters.

The work is being continued for the purpose of determining the optimum selection of the parameters for various types of turbines.

92. Degree of Reaction in Gas Turbine Design

"Experimental Investigation of the Stages of Gas Turbines With a Varying Degree of Reaction and α_1 = varia," by I. I. Kirillov, Bryansk Institute of Transport Machine Building; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 88-97

Degree of reaction is computed as a ratio of the heat drop in the wheel to the entire heat drop in the stage, in accordance with the complete parameters in front of the stage and the static pressure behind it.

When the degree of reaction is negative, increased energy losses occur in the root section of the stage.

The choice of degree of reaction for newly designed stages should be closely connected with the method of sealing the rotor at the periphery. Increasing the degree of reaction is of advantage where there is low leakage through the peripheral gap.

Stages with a small negative degree of reaction in the root section can operate satisfactorily, but a negative degree of reaction is very detrimental if the pressure in front of the discharge orifices in the disks is lower than in back of them. A slight turning of the entrance buckets causes a considerable change in the expenditure of gas and in the degree of reaction. In such a case, the additional losses of energy in the stage, which result from the changed flow around the entrance buckets, are relatively low.

The use of adjustable entrance buckets in gas turbine installations can serve as a means of lightening their work under partial loads.

93. Angle of Attack in Axial Compressor Design

"On the Choice of Angle of Attack in Designing the Shape of an Axial Compressor Stage," by V. S. Beknev, Moscow Higher Technical School; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 78-87

On the basis of literature data on a flow through a plane stage at $M < M_{cr}$, a formula is derived for determining the angle of attack corresponding to a normal regime of flow around the stage. Possible flow regimes for compressor stages are considered as an aid to a surer approach to design configurations of blades in relation to radius.

94. Stability of Axial Compressors

"Investigation of the Nonsteady State Aerodynamic Phenomena in Axial Compressors," by G. S. Samoylovich, Moscow Power Engineering Institute; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 66-77

Nonsteady state aerodynamic phenomena in turbines (rotary disturbances, flutter, hunting, etc.) were investigated by means of special low-inertia tensiometric probes, and the various patterns were recorded by oscillograph. In the case of rotary disturbances, air vibrations were observed only in the wheel stage system. Although rotary disturbance may cause hunting, the two do not occur together simultaneously.

95. Influence of Cooling on the Hydraulics of a Gas Turbine

"The Influence of Cooling on the Hydraulics of a Gas Turbine," by V. L. Ivanov; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 31-39

Certain experiments showed no influence of blade cooling on the hydraulic efficiency of a turbine stage of a gas turbine. Since certain experimental conditions of control were not in effect during the experiments, the Moscow Higher Technical School has constructed a single-stage gas turbine designed to guarantee the possibility of conducting experiments under various degrees of cooling intensity and of excluding concomitant influences.

96. Cooling of Turbines

"Cooling the Turbines of High-Temperature Gas-Turbine Engines," by K. M. Popov; Moscow, Izvestiya Vysshikh Uchebnykh Zavedeniy-Mashinostroyeniye, No 2, 1960, pp 19-30

From an approximate analysis of the effectiveness of various schemes for cooling multistage turbines, it is found that open-cycle air-cooling is feasible for gas temperatures not exceeding 1,400 deg K and with large temperature drops per stage. Although liquid cooling of the turbines practically guarantees operational safety at very high temperatures, the losses from the cooling may be considerable. The use of regenerative cooling cycles reduces such losses. Heat loss in multistage-cooled turbines can be reduced by increasing the heat drops in the first stages, while to preserve the optimum ratio of rpm to pressure constant it is advantageous to increase the diameter of the impellers, thereby reducing heat loss and facilitating the design of the cooled blades by making them shorter.

Photography

97. RDTsB-1 Recording Densitometer for Photographic Paper

"Recording Densitometer for Color and Black-and-White Photographic Paper, RDTsB-1," by A. N. Uspenskiy, Central Scientific-Research Institute of Geodesy, Aerial Surveying and Cartography (TsNIIGAiK); Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kenematografii, Vol 5, No 4, Jul/Aug 60, pp 255-261

Photographs, characteristics, and description are given of the RDTsB-1 instrument designed by Yu. I. Shevlyagin, developed by the Department of Aerophotography, and produced by the scientific-experimental shops of TsNIIGAiK.

98. Photographic Examination of Documents

"Photographing Luminescence in Reproduction Technique," by N. M. Zyuskin, Scientific-Research Institute of Legal Expertise, Kiev; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 5, No 4, Jul/Aug 60, pp 274-279

The article describes methods and equipment for photographing ultraviolet luminescence in forensic examination of documents.

Miscellaneous

99. Soviet Engineers Honored

"Ukase 387 and 388," Signed by N. Organov, Chairman of the Presidium of the Supreme Soviet RSFSR, and S. Orlov, Secretary of the Presidium of the Supreme Soviet RSFSR; Moscow, Vedomosti Verkhovnogo Soveta RSFSR, No 27, 1 Aug 60, p 377

By order of the Presidium of the Supreme Soviet of the RSFSR, the honorary title "Honored Scientist and Engineer" has been conferred on Vladimir Vladimirovich Vargin, Doctor of Technical Sciences and chief of a laboratory of the State Optical Institute imeni. S. I. Vavilov, and on Robert Semenovich Kinasoshvili, Doctor of Technical Sciences and chief of a laboratory of the Central Scientific Research Institute of Aircraft Engine-Building imeni P. I. Barnaov (TsIAM), "for their outstanding service in the field of science and engineering."

100. Linear Equations of an Infinite Numbers of Unknowns

"Concerning Well-Defined Solvability and Solution of Infinite Systems of Linear Equations," by Yu. I. Gribanov, Berlin University imeni Humboldt; Moscow, Doklady Akademii Nauk SSSR, Vol 129, No 6, Dec 59, pp 1211-1213

The necessary and sufficient conditions for well-defined solvability of the so-called ω, α, β-fully continuous systems of linear equations with an infinite number of unknowns are established, and the practical, feasible methods of their solutions are indicated. The results of the work represent interest for the theory, as well as for the application, of infinite systems of linear equations.

101. Characteristic Equation in Partial Derivatives

"On the Construction of a Characteristic Equation in Partial Derivatives of the First Order of a Countable Set of Variables on the Basis of the Reduction Method," by O. A. Zhautykov, Kazakh State Pedagogical Institute imeni Abae; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 3 (16), May/Jun 60, pp 127-140

An approach to the theory of a characteristic equation in partial derivatives of the first order of a finite number of variables of the form

$$F(x_1, x_2, \ldots, x_n, z, p_1, p_2, \ldots, p_n) = 0, \qquad (1)$$

different from the ordinary method, was indicated in the work "Methods of Mathematical Physics," R. Kurant and D. Gil'bert, Vol 2, GTTI, 1951, p 114

In the present work, the problem concerning construction of a characteristic equation in partial derivatives of the first order of a countable set of variables of the form

$$F(x_1, x_2, \ldots; z, p_1, p_2, \ldots) = 0,$$

is considered where $p_k = \frac{\partial z}{\partial x_k}$ $(k = 1, 2, \ldots)$, on the basis of the indicated point of view.

102. Stability of a Mixed Problem Considered

"Stability of Solutions of a Mixed Problem for a Hyperbolic Equation of the Second Order," by A. Kh. Gelig, Leningrad Pedagogical Institute imeni A. I. Gertsen; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 3 (16), May/Jun 60, pp 104-112

The stability of solutions of a mixed problem is understood to mean the continuous dependence of the solution on the initial and boundary value conditions and the free term, uniform according to the $[0, \infty]$.

S. L. Sobolev, in his work "Certain New Problems of the Theory of Equations in Partial Derivatives of the Hyperbolic Type," Matem. sb,, Vol 11 (53), No 3, pp 155-203, 1942 investigated the stability of the solutions of a homogeneous boundary value problem for a self-conjugate hyperbolic equation of the second order with coefficients depending only on $x_1, \ldots, x_n$ in a region bounded by a sufficiently smooth surface. O. A. Ladyzhenskaya considered this problem in her work "A Mixed Problem for a Hyperbolic Equation," GITTL, Moscow, 1953.

In the present work, the problem concerning the stability of the solutions of a homogeneous boundary value problem is considered for a general linear normal-hyperbolic equation of the second order in the four space.

103. Uniqueness of Limiting Cycles

"Concerning the Uniqueness Conditions of Limiting Cycles," by Ye. A. Barbashin and E. V. Vdovina, Ural Affiliate Academy of Sciences SSSR, Ural State University imeni A. M. Gor'kiy; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 3 (16), May/Jun 60, pp 43-47

In the present work, the differential equation

$$\ddot{x} + R(x, \dot{x}) + f(x) = 0 \qquad (1)$$

is considered which is equivalent to the system

$$\dot{x} = y$$
$$\dot{y} = -R(x, y) - f(x). \qquad (2)$$

It is assumed that in a certain convex region D, the following conditions are satisfied:

(a) $R(x, y)$ is continuous with respect to x, differentiable according to y, and $\frac{\partial R(x, y)}{\partial y} \gg 0$;

(b) $f(x) = f_1(x)$ for $y > 0$, $f(x) = f_2(x)$ for $y \leq 0$, where $f_1(x) = f_2(x)$ within the segment $[\xi_2, \xi_1]$ of the Ox axis lying in the region D.

(c) $f_1(x)$ and $f_2(x)$ are continuous functions of x.

$|f_2(x) - f_1(x)| \leq d$ within the segment $[\xi_2, \xi_1]$.

As is proved in the works of Ye. A. Barbashin and B. A. Tubuyeva, "Concerning the Existence Conditions of Limiting Cycles," PMM, Vol 23, No 5, 1959, pp 826-835, and "On Oscillations of a Pendulum in the Presence of Dry Friction," Izv. vuzov. Matem., No 5 (12), 1959, pp 48-57, the system (2) may have in the region D limiting cycles encompassing a certain fragment $[\eta_2, \eta_1]$ of the axis Ox.

In particular, in the first of the works mentioned, a series of sufficient conditions are given for the existence of limiting cycles; however, the question concerning uniqueness of these cycles remained open. In the present work, a series of conditions is given guaranteeing the uniqueness of a limiting cycle lying in the region D.

104. Particular Cauchy Problem Solved

"Fundamental Solution of the Cauchy Problem for the Equation $\frac{\partial^3 u}{\partial x \partial y \partial z} - \frac{1}{4}\frac{\partial u}{\partial t} = F(x, y, z, t)$,"
by Academician S. L. Sobolev, Mathematics Institute, Siberian Branch, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 129, No 6, Dec 59, pp 1246-1249

As was proved by I. G. Petrovskiy, Byull. Mosk. Univ. ser A, 1, Vol 7, No 6, 1938, p 27, the equation above belongs to those equations for which the Cauchy problem with the initial conditions t = 0 becomes correct. This equation represents interest as a nontrivial equation not related to one of the well investigated types. In addition, setting up of the mixed problem for it is peculiar, and we do not discuss it here.

In the present work, we construct the fundamental solution of the Cauchy problem for it in explicit form, that is, the solution of the equation.

$$\frac{\partial^3 G}{\partial x \partial y \partial z} - \frac{1}{4}\frac{\partial G}{\partial t} = \delta(x, y, z, t)$$

becomes identically equal to 0 for $t < 0$.

The function $\delta(x, y, z, t)$, as is known, is a homogeneous function of dimension -1 according to each of its arguments, i. e., a homogeneous function of dimension -4 of the product xyzt.

105. Integral Equations in the Banach Space Investigated

"On the Solution of Nonlinear Integral Equations in the Banach Space," by Ya. D. Mamedov; Baku, Doklady Akademiya Nauk Azerbaydzhanskoy SSR, Vol 16, No 4, Apr 60, pp 327-330

The work is based on the following lemma concerning integral inequalities:

Let $\varphi(t, s, u)$, $\alpha(t, V)$ be continuous on the set of variables $t_o \leq t$, $s \leq t_o + T$, $|u| \leq a$, $|V| \leq a$. Let there pass through each point of a certain rectangle Db: $t_o \leq t \leq t_o + T$, $|u| \leq b$, where $b < a$, a unique solution of the integral equation.

$$u(t) = \int_{t_o}^{t} \varphi[t, s; u(s)]\, ds + \alpha[t, u'(t_o)],$$

where $|u|(t_o)| \leq b$, lying inside Da.

Let the continuous function $W((t))$ ($|W(t)| \leq a$) satisfy the inequality

$$W(t) \leq \int_{t_o}^{t} \varphi'[t, s; W(s)]\, ds + \alpha(t, V), \text{ where}$$

$$|V| \leq b, \quad V \leq u(t_o).$$

Further, let the function $\varphi(t, s; u)$ not decrease with respect to u and let the function $\alpha(t, V)$ rigorously increase in V.

Then $W(t) \leq u(t)$ for $t_0 \leq t \leq t_0 + T$.

This lemma was employed by the author in his work' "Concerning One Application of Integral Inequalities," Uch. zap. AGU ser. fiz.-mat i khim., No 2, 1958, for generalizing the principles of compressed mappings and principles of a fixed point for an operator equation of the form

$$x(t) = F[t, x(t)]$$

in the space of functions $x(t)$ having values in the Banach space E. However, in the work mentioned, the assumption was made that operators $\bar{F}^{(n)}[t, x(t)]$ exist, satisfying the Lipschitz conditions and uniformly approximating the operator $F[t, x]$ with respect to t.

In the present work, the method of Tonelli is employed (see "Ordinary Differential Equations," IIL Vol 1, 1953), and the principle of fixed points is generalized without the condition indicated above in the case when

$$F[t, x] \equiv \int_{t_0}^{t} K[t, s; x(s)]\, ds + x_0 \quad (x_0 = x(t_0)),$$

where K is a continuous operator.

106. Integral Transformations With Volterra Kernels

"Integral Transformations With Volterra Kernels," by M. M. Dzhrbashyan, Institute of Mathematics and Mechanics, Academy of Sciences Armenian SSR; Moscow, Izvestiya Akademii Nauk SSSR, Seriya Matematicheskaya, Vol 24, No 3, May/Jun 60, pp 387-420

Various integral representations are given, and the asymptotic properties of the Volterra function

$$\nu(z; \mu) = \int_0^{\infty} \left\{ \Gamma(1 + \mu + t) \right\}^{-1} z^{\mu + t}\, dt$$

are investigated on the Riemannian surface $-\infty < \arg z < +\infty$. A theory of direct and inverse integral transformations is constructed in the class L_2 by kernels of the transformations which serve the function $\nu(xy; -1/2)$.

107. Fellerovsky Property of Markoff Processes

"Concerning the Fellerovsky Property of Markoff Processes," by M. G. Shur, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 129, No 6, Dec 59, pp 1250-1253

The homogeneous Markoff processes $X = (x_t, \zeta, M_t, P_x)$ with a space of elementary events Ω given in the measurable space (E, β) is considered. It is assumed that the σ-algebra of β is generated by a certain topology C of the space E where the system (E, C) forms a locally bicompact Hausdorff space with a countable basis. It is also assumed that the processes are continuous from the right and that $P_x \{\zeta > 0\} = 1$ for all $x \in E$.

With each process X is associated a subgroup of known form of the operators T_t operating in the L space of β-measurable bounded functions. Between the analytical properties of the subgroup T_t and the probabilities of the properties of the considered processes there exist definite relations. Several of these are studied in the present work.

108. Approximation of Periodic Functions

"Concerning the Approximation of Periodic Functions by Vallee Poussin Sums," by A. V. Yefimov; Moscow, Izvestiya Akademii Nauk Seriya Matematicheskaya, Vol 24, No 3, May/Jun 60, pp 431-468

Asymptotic exact equalities are given for the upper bound deviations of a function from its Vallee Poussin sum, distributed on the classes $W^r_\beta H_1 [w]$ and $W^o_\beta H_2 [w^*]$.

109. Simultaneous Approximation of Functions and Their Derivatives

"On the Problem Concerning the Simultaneous Approximation of Functions and Their Derivatives on the Entire Numerical Axis," by A. F. Timan; Moscow, Izvestiya Akademii Nauk SSSR seriya Matematicheskaya, Vol 24, No 3, May/Jun 60, pp 421-430

The problem concerning the simultaneous approximation on the entire real axis of differentiable functions and their derivatives by entire functions of the exponential type is considered. A generalization of the approximation theorem of S. N. Bernstein concerning functions bounded

and uniformly continuous on (-oo, oo) is given, and an inequality is obtained for the best approximations of derivatives of a function on the entire numerical axis approaching the known inequality of A. N. Kolmogorov, "Concerning Inequalities Between Upper Bounds of Sequences of Derivatives of a Function on an Infinite Interval," Uchen. zap. MGU, matematika, Vol 30, 1939, pp 3-16. It is established that during the uniform approximation of arbitrary functions on the entire numerical axis, the considered constants in certain cases are substantially greater than the corresponding constants during approximation of periodic functions of period 2 π by trigonometric polynomials.

110. Solution of Equations With Self-Conjugate Operators

"Concerning the Solution of Equations With Self-Conjugate Operators by the Method of Successive Approximations," by M. A. Krasnosel'skiy; Moscow, Uspekhi Matematicheskikh Nauk, Vol 15, No 3 (93), May/Jun 60, pp 161-165

For some time, a series of new works has been published in which the problem concerning application of the general method of successive approximations to the solution of linear integral equations was investigated. In connection with this, the author presented several simple general assertions from which, not only known, but also several new facts followed which may be useful.

111. Homomorphisms of Dynamic Systems

"Concerning Homomorphisms of Dynamic Systems," by V. A. Baydosov, Ural State University imeni A. M. Gor'kiy; Kazan', Izvestiya Vysshikh Uchebnykh Zavedeniy, Matematika, No 3, May/Jun 60, pp 21-29

The notion of homomorphism of a dynamic system was introduced by Ye. A. Barashin in his works "On Homomorphisms of Dynamic Systems I," Matem. sb., Vol 27 (29), No 3, 1950, and "On Homomorphisms of Dynamic Systems II," Matem. sb., Vol 29 (71), No 3, 1951. In these works, he indicated an extremely valuable means for the investigation of the many properties of dynamic systems. In the present work, certain algebraic problems associated with this notion are considered.

112. Self-Potential of Lattice Points in an Equilateral Triangle

"The Self-Potential of Lattice Points in an Equilateral Triangle," by O. Emersleben, Greifswald; Berlin, Mathematische Nachrichten, Vol 21, No 3/5, Mar/May 60, pp 160-192

The self-potential Φ D (n + 1) of homologously charged lattice points of a regular rhombic unit lattice inside an equilateral triangle are computed through the solution of differential equations. n + 1 is the number of lattice points (charges or mass points of amount 1) per edge of the equilateral triangle, and 1 is the shortest spacing; thus n is the length of the side.

The method of calculation is demonstrated by means of difference equations for an equidistant lattice line. A result derived earlier by the author is obtained here by a different method. Relationships of a type heretofore little investigated can be formulated quite simply.

VI. MEDICINE

Antibiotics

113. Search for New Antibiotics

"Some Results and Prospects of the Experimental-Clinical Investigation of Antibiotics in the Light of the Tasks of the Seven-Year Plan," by Prof Z. V. Yermol'yeva, Corresponding Member of the Academy of Medical Sciences USSR, Central Institute for the Advanced Training of Physicians; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, Vol 15, No 4, Apr 60, pp 36-44

"The search for new antibiotics, possible effective combinations of antibiotics, and the possibility of the chemical synthesis of antibiotics are the important tasks which are confronting our scientists in the years of the Seven-Year Plan. Considerable results have already been attained in this respect: the dibenzylethylene diamine salts of penicillin, penicillin-ekmo [apparently a combination of penicillin and ekmolin], and the iodo-ester of penicillin have considerably widened the spectrum of penicillin action; bicillin-1 and bicillin-3, of which dibenzylethylene diamine salt of penicillin is a component, are now being successfully used for the prevention of rheumatic attacks and complications caused by rheumatism; these same preparations have been found to be effective in the therapy of experimental syphilis and may be utilized for the complete eradication of the disease; dihydrostreptomycin pascate and streptomycin saluzid, developed by Ye. N. Lazareva, have been found to be effective against tuberculosis bacilli which are resistant to streptomycin; dibiomycin is effectively used in the therapy of trachoma. Preparations obtained from Acetobacters and conditionally known as "ciins" were found to be effective in the therapy of influenza toxicosis and radiation sickness. A single dose of the drug applied 24 hours before the administration of radiation prolonged the lives of the irradiated animals. The search for new antibiotics will be carried out with greater intensity in the coming years."

114. Sundew as a Source of an Antibiotic

"Sundew as a Medicinal Plant," by B. P. Kozlov, Tr. Leningr. Khim.-Farmatsevt. In-ta (Works of the Leningrad Chemico-Pharmaceutical Institute), No 8, 1959, pp 97-106 (from Referativnyy Zhurnal--Khimiya, No 11, 10 Jun 60, Abstract No 43780, by A. Vavilova)

"It was experimentally established that the active principle in sundew, a round-leaf grass, is plumbagin, an antibiotic— 2- methyl -5-oxy-naphthoquinone-1,4. The isolated preparation is highly antibacterial in

regard to the pertussis bacillus when used in a dilution of 1 : 300,000, and to the tuberculosis bacillus when used in a dilution of 1 : 50,000. No tannins were found in the plant. The following composition is recommended for an antiwhooping cough preparation: fluid extract of sundew, 12 parts; simple syrup, 82 parts; and ethyl alcohol, six parts. Bibliography -- 25 titles."

Contagious Diseases

115. Fatal Psychosis-Like Disease Diagnosed as Tularemia

"Bacteriological Verification of Tularemia in a Case of Death From a Disease Which Proceeded as a Type of Acute Infectious Psychosis," by M. F. Shmuter, Tr. Sredneaz. N.-I. Protivochumn. In-ta (Works of the Central Asian Scientific Research Antiplague Institute), No 4, 1958, pp 265-266 (from Referativnyy Zhurnal -- Biologiya, No 11, 10 Jun 60, Abstract No 48986, by M. Boyarskaya)

"A case of death from tularemia which proceeded with manifestations of acute infectious psychosis is described. In an investigation of the patient's blood, the agglutination reaction was negative, and the tularin test was positive. A B. tularense culture was isolated from liver and spleen scrapings of the deceased. Guinea pigs and mice infected with scrapings from mesenteric lymph nodes died with pathological-anatomical changes characteristic for tularemia, but without isolation of B. tularense. The infection of animals with SMZh [not further explained] from the deceased, as well as the agglutination reaction with the same SMZh, gave negative results."

116. Tick-Borne Spirochetosis in Laboratory Animals

"A Comparative Study of the Course of Tick-Borne Spirochetosis in Laboratory Animals," by L. V. Shtyreva, Sb. Nauchn. Tr. Tashkentsk. Med. In-ta (Collection of Scientific Works of the Tashkent Medical Institute), No 12, 1958, pp 187-196 (from Referativnyy Zhurnal --, Biologiya, No 13, 10 Jul 60, Abstract No 59515)

"It was found that guinea pigs and adult white rats are equally susceptible to infection with Spirochaeta sogdiana and S. caucasica and are not susceptible to S. latyschevi. The course of infection was identical in guinea pigs, mice, rats and rabbits infected with S. caucasica and S. sogdiana. Mice and newborn rabbits are susceptible to S. latyschevi. Transferred tick-borne spirochetosis is produced in the majority of cases in animals not susceptible to repeated infection with homologous spirochetes. Infection with spirochetes of another species led to the development of the disease in all cases."

117. Epidemiology of Leptospiroses

"The Role of Fresh Water Animals in the Epidemiology of Leptospiroses," by N. M. Blagoveshchenskaya and V. M. Kruglova, Rostov-on-Don Institute of Epidemiology, Microbiology and Hygiene, and the Scientific Research Biological Institute of Rostov State University; Moscow, Zoologicheskiy Zhurnal, Vol 39, No 5, 1960, pp 661-665

The part played by fresh water animals in the epidemiology of leptospiroses was studied by the authors in investigations of hydrobionts from natural water bodies in the infection sites and by experimentally infecting some fresh water animals with pathogenic leptospira.

No infestation of hydrobionts with leptospira was found under natural conditions. The experimental infection of 123 fresh water invertebrates (Rivulogammarus pulex, Mollusca, Corixa punctata) with pathogenic leptospira by various methods was a failure. Pathogenic leptospira preserved their viability in the organism of fish (Neogobius melanostomus) for 24 hours.

The representatives of the invertebrates studied did not preserve pathogenic leptospira in nature. The question concerning the role of fish, frogs, and certain forms of invertebrates inhabiting reservoirs in the epidemiology of leptospiroses requires further study.

118. Tularemia Induced in Sheep

"Data on Experimental Tularemia in Sheep," by V. G. Ayrapetyan, Z. B. Khachatryan, A. A. Pogosyan, and G. G. Martirosyan, Tr. Armya. N.-I. In-ta Zhivotno-vodstva i Veterinarii (Works of the Armenian Institute of Animal Husbandry and Veterinary Medicine), No 1, 1956, pp 63-80 (from Referativnyy Zhurnal -- Biologiya, No 11, 10 Jun 60, Abstract No 48976, by I. Panchenko)

"Tularemia of sheep was first described in the USSR in 1938; however, a method of diagnosis while the infected animal is still alive has not yet been sufficiently developed. In a focus of an acute outbreak of tularemia among sheep-processing workers, the latter were examined serologically, allergically, and bacteriologically. Tularemia bacteria were not found in bacteriological examination of sheep which gave a positive agglutination reaction with tularemia antigen in a titer of 1:200-1:50, but were found in some instances in animals which did not react positively in the agglutination and allergic reactions. A positive agglutination reaction in a titer of 1:400 was observed 5 days after the infection of sheep with a B. tularense culture. On the 10th day, the agglutination titer increased sharply (to a maximum of 1:3200), then gradually decreased, reaching 1:700 on the 15th day and 1:50 on the 45th day.

Toward the sixth month, the titer was maintained at a level of 1:25-1:50. The blood droplet reaction fluctuated during 5 months within the limits of the time (1/2 minute) generally allowed for calculation of the results. The authors suggest that the combination of the indexes of the agglutination reaction performed by the volumetric and blood-droplet methods can be most valuable on a practical basis. The complement fixation reaction and the allergic reaction with tularin were found to be unsuitable for the diagnosis of tularemia in living sheep. It was established by bacteriological examination of infected sheep that B. tularense enters the blood stream from the introduction site within 48 hours, permeating almost all the internal organs, the muscles, and the skin by about the seventh day. Bacteria were observed during the first 15 days, rarely later. B. tularense were preserved in the parenchymatous organs of frozen corpses for as long as 120 days, but not more than 60-75 days in the muscles."

119. Chinese Discover Ticks as Carriers of R. Tsutsugamushi for the First Time

"Study of the Natural Infection of Ticks Ixodes sp. With R. Tsutsugamushi," by Yuan Kwang-lieh, Yi Ying-nan, Kao Ling-yin, Lin Chin-shui, Yu En-shu, and Cheng Bi-de; Chinese Journal of People's Health, Vol 1, No 8, 1959, pp 703-732 (from Meditsinskiy Referativnyy Zhurnal, No 7, Part III, Jul 60, Abstract No 2588)

"During the summer of 1957, in the hilly regions in the northern part of Fukien, a large number of ticks collected from wild mice and rats were studied. Strains of R. tsutsugamushi were isolated from ticks Trombicula deliensis and Ixodes sp. taken from wild rats caught in the vicinity of Shao-Fu. The strain isolated from Ixodes sp. was shown to be identical with the strains isolated from tsutsugamushi fever patients by biological methods involving both serological investigations and the infection of experimental animals. Therefore, for the first time it has been shown that ticks are the carriers of R. tsutsugamushi in nature."

Immunology and Therapy

120. Effect of Pilocarpine on Tularemia Vaccination

"The Effect of Pilocarpine on the Immunological Reaction After Experimental Immunization With Live Tularemia Vaccine," by A. S. Shevelev, Tr. Smolenskogo Med. In-ta (Works of Smolensk Medical Institute), No 10, 1958, pp 59-64 (from Referativnyy Zhurnal -- Biologiya, No 11, 10 Jun 60, Abstract No 48980, by E. Gurevich)

The action of pilocarpine on the elaboration of antibodies and on the allergic reaction after the immunization of guinea pigs and rabbits with live tularemia vaccine was studied. Small doses of pilocarpine (0.05

mg/100 g) accelerated the process of allergic reconstruction of the organism after immunization; all pigs gave a positive allergic reaction on the ninth day after vaccination. Large losses of pilocarpine (0.5 mg/100 g) suppressed immunological reactions. An insignificant increase in the antibody titer was observed only after the prolonged introduction of small doses of pilocarpine, which may have resulted from the late collection of blood (on the 15th day after vaccination).

(In the experiment on rabbits, the stimulating effect of pilocarpine (0.05 mg/100 g) on the elaboration of antibodies was noted only after 4 and 24 hours after its introduction; within 48, 72, and 96 hours, no differences in agglutinin titers in experimental and control animals were observed. An anamnestic immunological reaction was obtained upon the introduction of pilocarpine 5 consecutive days in a dose of 0.05 mg/100 g) in all pigs vaccinated 6 months before the experiment and in two out of four pigs infected additionally after 2 months with a virulent B. tularense strain. It was noted that an increase in the allergic reactivity of the organism and an increase in the agglutinin titer were clearly expressed after primary vaccination and were absent after revaccination."

121. Tularemia Diagnosis and Determination of Immune Condition of Vaccinates

"Cutaneous Tularin From a Vaccine Strain for the Determination of Immunity in Persons Inoculated Against Tularemia and Diagnosis of This Infection," by N. G. Olsuf'yev, V. P. Borodin, and Ye. M. Tsvetkova, Vopr. Epidemiol. i Profilaktiki Tulyaremii, (Problems of the Epidemiology and Prophylaxis of Tularemia), 1958, pp 156-158 (from Referativnyy Zhurnal -- Biologiya, No 11, 10 Jun 60, Abstract No 48982)

"The high effectiveness of cutaneous tularin from a vaccine strain was verified by testing of cutaneous tularin from vaccine and virulent strains on 3968 vaccinates and 212 persons who had recovered from tularemia (the technology of the tests is described). The specificity of the test with cutaneous tularin, which is technically simpler than the test with subcutaneous tularin, was demonstrated in massive observations of the population. Cutaneous tularin was less reactogenic than intracutaneous."

122. Therapy of Proserine and Eserine Intoxications

"An Analysis of the Difference in the Effects Caused by Anticholinesterase Preparations," by V. B. Prozorovskiy, Laboratory of Pathophysiology, Institute of Toxicology, Academy of Medical Sciences USSR; Moscow-Leningrad, Fiziologicheskiy Zhurnal SSSR imeni I. M. Sechenov, Vol 42, No 5, May 60, pp 623-628

The results of experiments conducted to determine the effectiveness of atropine, tropacin, and curare when used in the therapy of proserine and eserine intoxications are reported. Albino male mice were used in the experiments. Proserine and eserine in doses which killed about 90 percent of the control animals were administered to the mice. The experiments established that atropine is considerably more effective in the therapy of proserine intoxication than of eserine intoxication; tropacin is equally effective in cases of proserine and eserine intoxications; atropine and tropacin are more effective in proserine and eserine intoxication than curare.

123. Therapy of Toxic Conditions in Children

"Application of Neuroplegic Preparations in the Complex Therapy of Toxic Conditions in Early Childhood," by Yu. Ye. Veltishchev, Chair of Pediatrics, Central Institute for the Advanced Training of Physicians; Moscow, Pediatriya, No 7, Jul 60, pp 65-69

Three factors play a dominant role in the pathogenesis of the toxic syndrome: intoxication, disturbed water-mineral metabolism, and shock. Successful therapy is possible only when means of counteracting these three factors are applied. Mortality from the syndrome which combined these factors is still relatively high despite the discovery of new drugs, and the application of antibiotics. Aminazine and promazine are now being employed in the complex of therapeutic measures applied to control morbidity and mortality from the disease. The initial results indicate that these preparations are beneficial when applied in cases of neurotoxicoses and acute toxicoses accompanied by exsiccosis. They have been found to be ineffective in cases of deep comas, collapse, and toxico-septic conditions. Promazine has been found to be more effective than aminazine.

124. Therapy of Burns

"Effect of Natural Dextran on the Development of Edema of Burned Tissues and on Hemoconcentration in Large Area Burns," by Prof M. V. Svyatukhin, A. A. Bodarev, and D. N. V'yunkovskiy; Moscow, Problemy Gematologii i Perelivaniya Krovi, Vol 5, No 4, Apr 60, pp 39-44

It was established in experiments carried out on rabbits which were suffering from extensive burns that the intravenous administration of dextran had an inhibiting effect on the development of edema of the burned tissues and prevented hemoconcentration in the burn areas. It was established also that the intravenous administration of dextran does not affect blood pressure, modifies the tonus and permeability of the blood vessels at the focus of acute inflammation, and inhibits the hemoconcentration in large area burns. The experiments failed to confirm the supposition that the administration of natural dextran produces a shock-like state and that the inhibitory effect on the development of edema and hemoconcentration is due to deep circulatory disturbances. Further study of the properties of natural dextran and its effect on the organism is urged by the author.

125. Burn Center in Moscow and the Treatment of Severe Extensive Burns

"Treatment of Severe Extensive Burns," by R. L. Ginzburg, Central Institute of Traumatology and Orthopedics, Ministry of Health USSR; Moscow, Khirurgiya, No 6, Jun 60, pp 93-97

The author lists a total of 396 burn cases, of which 332 were due to thermal burns from high-temperature electric currents. Among these, 56 victims suffered third-degree burns, and all were treated and recovered except two.

The author defines burn trauma as "burn sickness" and considers various complications, such as burn shock, toxemia, infections, and exhaustion, which accompany burn injury.

Various methods of treating severe extensive burns (radical surgery; transfusions of serum, plasma, and whole blood; a series of blood letting and blood transfusion; oxygen therapy; and use of antibiotics, drugs, etc.) are discussed. The use of stored refrigerated skin homotransplantations and the administration of serum or whole blood taken from recovered burn victims proved to be very effective.

The author stresses the necessity of the cooperative work of clinicians, hematologists, bacteriologists, biochemists, histologists, histochemists, and endocrinologists in resolving this major and important problem of treating severe, extensive burns.

The organization of the "Burn Center" in Moscow makes it possible for a great amount of data to be checked with regard to the present concept of the mechanism in burn trauma and also saves the lives of many patients who previously were thought hopeless.

Oncology

126. Results of Attempts at Malignant Tumor Transplantation

"Attempts at Cultivating Human Malignant Tumors on Chick Embryos," by T. M. Mayevskaya and T. V. Migulina, Institute of Virology imeni D. I. Ivanovskiy and the State Control Institute imeni L. A. Tarasevich; Moscow, Arkhiv Patologii, No 7, 1960, p 39-45

Forty-three malignant human tumors with various localization were cultured on the chorioallantoic membrane of developing chick embryos. Attempts at transplanting carcinoma of the stomach, mammary glands, and uterus were unsuccessful as no multiplication of the carcinoma cells occurred. With melanoma, it was possible in many cases to obtain cancerous tissue growth in the first passage. According to their morphological characteristics and their ability to form pigment, the transplants obtained were completely identical to the original tumor. Attempts at transplanting the tumors to the brains of mice and rats remained unsuccessful.

Pharmacology and Toxicology

127. Effect of Neuroplegics and Hormones on the Organism

"Certain Characteristics of the Pharmacodynamics of Neuroplegic Substances and Steroid Hormones," by A. I. Sikharulidze, Scientific-Research Institute of Psychiatry imeni M. M. Asatiani; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 24, No 3, Mar 60, pp 351-355

Dogs were used in experiments which were conducted to determine the effect of aminazine -- a neuroplegic substance, steroid hormones, testosterone, and estrone, in particular, on certain functions of the organism. The experiments established that aminazine in small doses of 0.5 to 0.65 milligram per kilogram body weight intensified conditioned and unconditioned salivary and glandular secretions, while in larger doses of 1.5 to 2.0 milligrams per kilogram body weight had a depressing effect on both functions. Steroid hormones in small doses intensified salivary and glandular secretions, while in large doses -- testosterone in doses of 10 milligrams per kilogram body weight and estrone in doses of 20 units per kilogram body weight -- depressed both functions. Adrenalin in a dose of 1.0 milliliter of 1:1,000 counteracted the inhibiting effect of steroid hormones.

128. Effect of Hexenal on the Nervous System

"Effect of Hexenal (Evipan-Sodium) on the Higher Nervous Functions in Dogs in Normal and Neurotic States," by Z. N. Bolotova, Tr. Ukr. N.-I. Psikhonerol. In-ta (Works of the Ukrainian Scientific-Research Psychoneurological Institute), No 29, 1958, pp 241-247 (from Referativnyy Zhurnal -- Biologiya, No 12, 25 Jun 60, Abstract No 58193, by U. Gasanov)

"The effect of different doses of hexenal (0.5 to five milliliters of a 10-percent solution) was studied in dogs in which conditioned reflexes were developed by secretion, motor-digestive, and motor-defense methods. The depth and duration of the disturbed conditioned reflex activity depended on the dose of the drug administered and on the type of nervous system of the animal. Large doses of hexenal produced a sharp intensification of the digestion and orientation conditioned reflexes, as well as a general motor stimulation. Hexenal administered in doses of 0.5 to 0.6 gram for a period of 5 days exhibited a therapeutic effect in cases of experimental neuroses; this effect was apparent from 3 days to 3 weeks after the completion of the course of injections."

129. Nervatil -- a New Ataractic Drug

"Pharmacological Action of Nervatil, a New Rumanian Ataractic Preparation," by V. Mureseanu, M. Simionovici, and D. Winter, Viata Med (Rumania), Vol 6, No 1, 1959, pp 9-13 (from Referativnyy Zhurnal -- Biologiya, No 10, 25 May 60, Abstract No 47751, by E. Sheynbaum)

"Nervatil (suavitil, benactyzine) has expressed atropine-like, cholinolytic, and antispasmodic action. When administered to rats in doses of 1-10 milligrams per kilogram body weight and to monkeys in doses of 1-6 milligrams per kilogram body weight, it is nontoxic. The DL_{50} for rats is 30 milligrams per kilogram body weight when intravenously administered and 155 milligrams per kilogram body weight when intraperoneally administered. Nervatil prolongs the anesthetic effect of ether by 50 percent, prolongs by 2-3 times the anesthetic effect of hexobarbital, and also acts as a local anesthetic. Nervatil relieved anxiety, asthenia, headaches, insomnia and states of depression and irritability in most of the 30 patients who were suffering from asthenic neurosis. Nervatil is well tolerated and is not habit-forming."

130. Dicoumarin Therapy of Neuropsychic Disturbances

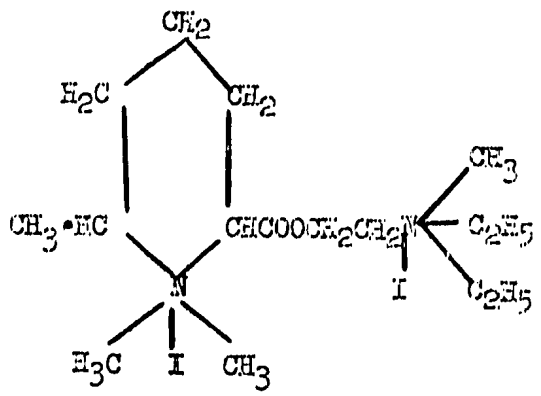
"Effectiveness and Physiological Foundations of the Application of Dicoumarin in the Therapy of Hypertension and Atherosclerosis of the Cerebral Vessels Accompanied by Neuropsychic Disturbances, by V. D. Gaponova, Tr. Gos. N-I Psikhonevrol. In-ta (Works of the State Scientific Research Psychoneurological Institute), No 18, 1959, pp 39-42 (from Referativnyy Zhurnal -- Biologiya, No 9, 10 May 60, Abstract No 42854, by G. I. Arsen'yev)

"The prothrombin level in the blood of 130 patients suffering from psychoses which developed with a background of hypertension or atherosclerosis of the cerebral vessels varied within the limits of 80 to 150 percent, but most frequently was within the limits of 115 to 120 percent. On this basis, dicoumarin in doses of 50 milligrams was administered to 103 patients 2-3 times in 24 hours. With the decrease of the prothrombin level, an improvement in the clinical picture of the neuropsychoses and the general condition of 80 patients was noted. Dicoumarin was found to be particularly effective when administered to patients suffering from acute neuropsychic disturbances and comparatively recent development of the disease.. Dicoumarin therapy of patients suffering from hypertension reduced maximal pressure by 20-40, and minimal by 10-40 millimeters. In cases in which favorable therapeutic results were obtained, the permeability of the vascular walls, which had been depressed, increased, and the chronaxy indexes which had been disturbed were restored to normal. The anticoagulating properties of dicoumarin apparently are not the only factor in the mechanism of its action."

131. Ganglioblocking Preparation

"Dicholine -- a New Ganglioblocking Preparation," by I. M. Sharapov, All-Union Scientific-Research Chemico-Pharmaceutical Institute imeni S. Ordzhonikidze; Moscow, Meditsinskaya Promyshlennost' SSSR, Vol 14, No 7, Jul 60, pp 55-58

Dicholine, a strong new ganglioblocking preparation, was synthesized at the M. V. Rubtsov laboratory. Chemically, it is the diiodo-methylate of the diethylaminoethyl ester of 1,6-dimethylpipecolinic acid. Its structural formula is as follows:



$C_{16}H_{34}O_2N_2O_2$

Dicholine is a white crystalline powder, readily soluble in water; it dissolves with difficulty in alcohol and is insoluble in ether and acetone. In experiments carried out on cats and rabbits it was established that dicholine is a powerful ganglioblocking preparation; it is highly effective in the therapy of hypertension, astheno-depressive states, paranoid condition, and chronic alcoholism. Pharmacologically, dicholine is close to pentamine, hexonium, and other ganglioblocking drugs. It is, however, more active than the other preparations, and its effect is considerably more lasting than that of the other ganglioblocking drugs.

132. New Cholinolytic Preparations

"The Effect of a Number of New Cholinolytic Preparations on the Peripheral Cholinoreactive Systems," by G. Tsitk, Fiziol. Rol' Atsetilkholina i Izyskaniye Novykh Lekarstv. Veshchestv (The Physiological Role of Acetylcholine and the Search for New Medicinal Substances), 1957, pp 161-174 (from Referativnyy Zhurnal -- Biologiya No 10, 25 May 60, Abstract No 47805, by V. Shashkov)

"The hydrochlorides, iodomethylates, iodoethylates, and methylsulfamethylates of pentaphen (I) and diphasin (II), as well as the hydrochlorides, ethylmethylates, and iodoethylates of alpha-methyldiphasin (III) and arpenal (IV), were investigated in acute experiments on cats under lexenal and urethan anesthesia. The hydrochlorides of I and IV, when intravenously administered in doses of 2-3.5 milligrams per kilogram body weight, reduced the contraction level of the third eyelid of the cat caused by the irritation of the preganglionic fibers of the sympathetic nerve by right-angle impulses of optimum frequency. The hydrochloride of II (5-10 milligrams) intensified [this effect] and, in doses of 20 milligrams per kilogram body weight (toxic dose), relaxed the eyelid. The hydrochloride of III began to block the transmission of impulses in the ganglion when administered in doses of 5-7 milligrams per kilogram body weight."

"The iodomethylates, methylsulfamethylates, and iodoethylates of I, II, and IV, when administered in doses of 0.2-0.5 milligram per kilogram body weight, relaxed the third eyelid, while those of II required doses of 1-0.5 milligrams per kilogram body weight to relax the third eyelid. Doses exceeding those mentioned above by 5-10 times were required for the complete blocking of the transmission of impulses through the ganglia. Depressor effects which developed as a result of the irritation of a peripheral section of the vagus nerve by an induction current were fully removed by doses of the preparations ten times smaller than those which retarded the transmission of impulses in the sympathetic ganglia; the correlation of doses of the tertiary and the quaternary derivatives were, however, retained. Doses of the preparations 40-100 times larger than those which were required to eliminate the effects of the irritation of the vagus nerve were necessary to eliminate the depressor effect caused by acetylcholine (one milliliter of the solution intravenously in a concentration of 1.10^{-5} at intervals of 5-10 minutes). The sensitivity of the n-cholinoreceptors of the sino-carotid zones, the adrenal medulla, and the automatic ganglia when irritated by the preparations under investigation was about the same for all."

133. Effect of Cyclamen Preparations on the Organism

"Investigations Conducted to Determine the Effect of Preparations of Azerbaydzhan Cyclamen of the Primrose Family and Their Effect on the Organs of Circulation," by I. K. Gol'berg and A. G. Khain; Baku, Azerbaydzhanskiy Meditsinskiy Zhurnal, No 3, Mar 60, p 56

"Preparations of Azerbaydzhan cyclamen (0.5 percent of an aqueous infusion or alcoholic tincture) were found to be highly toxic in experiments carried out by the author and may be grouped with those poisons which affect all cells. They contain a large number of saponins and predominantly affect respiration and the cardiac muscle. Because of their strongly expressed toxicity, preparations of Azerbaydzhan cyclamen cannot be used in medicine as expectorants or cardiacs despite their saponin content."

134. Effect of Manganese on the Organism

"On the Biological and Therapeutic Properties of Manganese (Experimental and Clinical Investigations)," by Yu. P. Kolesnikova, Tr. Kharkovsk. Med. In-ta (Works of the Kharkov Medical Institute), No 37, 1938, pp 225-232 (from Referativnyy Zhurnal -- Biologiya, No 9, 10 May 60, Abstract No 42634, by R. S. Vorob'yeva)

"Two groups of rabbits were given cholesterol alone or cholesterol daily in combination with vitamin D in different doses for periods of 3-5 months. One group of the animals was given a solution of manganese sulfate intravenously in addition (in doses of one milligram per kilogram body weight). The cholesterol level in the animals of the first group which received manganese alone reached an average of 985.8 percent; in the second group, which received the manganese sulfate in addition, the cholesterol level reached an average of 438.6 percent. Atherosclerotic modifications and hepatic adiposis were less pronounced in the animals which were administered manganese sulfate than in those which were given cholesterol alone. A single dose of 0.5 milligram per kilogram body weight of manganese sulfate administered to patients suffering from diabetis mellitus, atherosclerosis, and hypertension produced a decrease in the blood content of cholesterol. Manganese sulfate administered daily in doses of 0.3 milligram per kilogram body weight for periods of 7-10 days restored cholsterinemia to normal and intensified the oxidation processes."

135. Effect of Trichloroethylene on the Organism

"Data on the Mechanism of the Action of Trichloroethylene," by Z. Dezsi and B. Bajko, Obstetr. si Ginecol. (Rumania), Vol 6, No 2, 1959, pp 141-144 (from Referativnyy Zhurnal -- Biologiya, No 12, 25 Jun 60, Abstract No 58195, by E. Sheynbaum)

"It was kymographically established that trichloroethylene (I:narcogen, 50 milliliters of a one percent solution) reduces the tonus and spontaneous contractions of an isolated uterus of a guinea pig and completely halts contractions induced by glanduitrin (0.2 international units), ergotine (5 milligrams), cholinergic preparations (10 gamma of acetylicholine, 50 gamma of physostigmine, 50 gamma of arecoline, and 50 gamma of aconitine), and $BaCl_2$ (3 milligrams) after treatment with nicotine. Therefore, I may be grouped with spasmolytic substances which affect the neurogenic, as well as the myogenic, spasms. In addition to its central action, trichloroethylene possesses a peripheral action affecting the cholinergic terminals and the smooth muscles."

136. Effect of Some Anesthetics on Hemopoiesis

"Effect of Thiopental-Sodium and Ether Anesthesia on Hemopoiesis," by I. P. Sarnitskiy, Tr. Kievsk. N.-I. In-ta Perelivaniya Krovi i Neotlozhn. Khirurgii (Works of the Kiev Scientific-Research Institute of Blood Transfusion and Emergency Surgery), No 2, 1958, pp 237-241 (from Referativnyy Zhurnal -- Biologiya, No 12, 25 Jun 60, Abstract No 58192)

"Experiments carried out on 10 healthy adult dogs established that thiopental-sodium anesthesia has no essential effect on the morphological composition of the peripheral blood and on hemopoiesis. Ether anesthesia produces an insignificant change which is of brief duration."

137. Effects of Some Cholinolytics

"The Effect of Substances, Acting in the Area of Central Cholinergic Synapses, on the Function of the Adrenal Cortex," by A. N. Poskalenko, Chair of Pharmacology, Leningrad Sanitary-Hygiene Medical Institute; Moscow, Problemy Endokrinologii i Gormonoterapii, No 4, 1960, pp 14-17

Previous experiments have shown that diphacyl, a central cholinolytic, reduces the amount of ascorbic acid in the adrenal glands of rats and provokes eosimopenia in the blood of animals (rats and mice). This indicated a rise in adrenal cortex activity. Experiments on hypophysectomized animals demonstrated that the ACTH of the hypophysis participated in the intensification of the cortical activity of the adrenal glands.

In these experiments, it was determined that diphacyl in doses of 6-10 mg/kg produced a rise in the level of 17 oxycorticosteroids in the blood of dogs (from 3.25 μ per 100 ml of plasma up to 9.73 μ /100 ml).

Physostigmin (1 mg/kg), an anticholinesterase substances, increased the amount of ascorbic acid in the adrenal glands of rats, thus indicating the activation of some hypophyseal-adrenal mechanism, controlling some adrenal cortical activity. Diphacyl partially alleviated the effect of physostigmin. The antagonism between physostigmin and diphacyl was reciprocal since the effect of diphacyl was also reduced after the administration of physostigmin.

138. Toxicity Studies of Helminthic Antigens

"The Toxic Properties of the Antigens of Some Helminths," by Sh. A. Azimov, Dokl. AN UzSSR (Reports of the Academy of Sciences, Uzbek SSR), No 10, 1959, pp 61-63 (from Referativnyy Zhurnal Khimiya -- Biologicheskaya Khimiya, No 13, 1960, Abstract No 18203, by T. Nyevskaya)

"The polysaccharide antigens of dichrocella possess toxic properties. Its intraperitoneal administration to mice in doses of 90-150 mg in one ml of physiological solution, to guinea pigs -- 350-400 mg in one ml of physiological solution, and to rabbits -- 700-1,000 mg in 2 ml of physiological solution killed the animals. The polysaccharide antigens from tizaniyeziy also possess toxic properties. Its intraperitoneal administration to mice in doses of 90-150 mg per one ml of physiological solution, to guinea pigs in doses of 20-500 mg in one ml of physiological solution, and to rabbits in doses of from 840-1,000 mg in one ml of physiological solution is fatal. In large doses, the polysaccharide antigen from tizaniezly is also toxic to lambs. Its administration to lambs in doses of 1,025 mg per 2 ml of physiological solution subcutaneously and 600 mg per 2 ml of physiological solution intravenously is fatal."

139. Research on Fatigue

"Occupational Fatigue and Methods of Its Study," by Prof S. A. Kosilov, Institute of Industrial Hygiene and Occupational Diseases, Academy of Medical Sciences USSR; Moscow, Vestnik Akademii Meditsinskikh Nauk SSSR, No 5, 1960, pp 54-61

The author of this article discusses a complex method, for careful investigation and thorough analysis of labor physiology, conducted in order to determine what conditions may have an optimum effect upon workmen in a given industry. He also points out what has already been learned about the effect of industrial fatigue on the output of a plant and what has been done to improve the ability of the human organism to fulfill a concrete assignment. Studies have been conducted both under laboratory conditions and in industrial establishments. It can be said that industrial physiologists are now closer to realization of the essence of fatigue as a complicated, many-sided process than they were 20 years ago.

Physiologists, who have been studying various organs, have been trying to determine to what extent oxygen deficiency, accumulation of dissimilation products, etc. are connected with fatigue. At the present time, it is possible to considerably expand investigation of the process of fatigue by conducting studies which would help in determining the extent to which fatigue is dependent on manifestation of parabiotic inhibition, protective inhibition, and disruption in interaction between cortical signal systems. One of the most important results of the studies conducted in that respect is the successful investigation by Soviet industrial physiologists of manifestations of fatigue encountered in work not connected with expenditure of great amount of energy, but which places great demands on the function of the nervous system.

140. Effects of Air Temperature Changes on Man

"The Hygienic Significance of Temperature Changes of the Atmospheric Air," by Corresponding Member, Academy of Medical Sciences USSR, Prof G. Kh. Shakhbazyan, Candidate of Medical Sciences F. M. Shleyfman, and I. G. Veksler, Kiev Medical Institute and Institute of Industrial Hygiene and Occupational Diseases; Moscow, Vestnik Meditsinskikh Nauk SSSR, No 5, 1960, pp 62-66

The authors of this article state that results of studies conducted in the Institute of Industrial Hygiene and Occupational Diseases and data found in literature show that frequent and long periods of exposure to temperature changes of the atmospheric air can cause profound changes

within a living organism, weakening its protective resources and reducing its biological capacity to resist negative forces including infections. This points to hygienic importance of changes in temperature of the atmospheric air and confirms the need for regulating this temperature throughout each industrial establishment. In doing that, the function of thermoregulation, immunobiological reaction, and other processes taking place within the organism must be considered.

141. Effect of Light Irritants on the Organism

"Effect of Light Irritants on the Visual Analysor and the Cardio-Vascular System in Man," by M. P. Kirpichev, Chair of Public Hygiene, Leningrad Sanitary Hygiene Medical Institute; Moscow, Gigiyena i Sanitariya, Vol 25, No 7, Jul 60, pp 17-22

Investigations conducted by the author established that a flashing light emitted by a fluorescent lamp increases visual fatigue and has a stronger effect on the cardio-vascular system than a nonflashing light; a blinding light, when repeated, is capable of causing a recurrence or the development of functional disturbances of the cardio-vascular system.

142. Radial Acceleration Found to Affect Intestinal Secretions

"The Effect of Radial Accelerations on the Secretion of Intestinal Glands in Dogs," by P. M. Suvorov: Moscow, Byulleten" Eksperimental'noy Biologii i Meditsiny, Vol 49, No 6, Jun 69, pp 54-57

The author of this article states that results of 192 experiments conducted on 4 dogs showed that radial accelerations of between 5 and 9 gs, lasting 20-60 seconds, cause considerable changes in the secretion of juice by the intestinal glands. No changes in the secretion of juice by the intestinal glands was noted immediately after each dog was subjected to radial accelerations. Increase in the intestinal secretion was noted, however, the day following exposure to accelerations; the activity of amylase and phosphotase and the amount of the solid portion of intestinal juice also increased. This lasted several days, dropping after that to the original level. Decrease in the intestinal secretion was noted after repeated exposure to the action of radial acceleration of the same number of gs. Exposure to increased radial accelerations caused resumption of pronounced changes in intestinal secretion.

This article was submitted to the editorial office of the periodical on 18 August 1958 by Active Member of the Academy of Medical Sciences USSR V. V. Parin.

143. Physical Exercise and Blood Cholesterol Level.

"The Effect of Physical Exercises of Various Types on the Cholesterol Content in the Blood," by N. K. Popova, Sector of Biochemistry of the Leningrad Scientific Research Institute of Physical Culture; Kiev, Ukrainskyy Biokhimichnyy Zhurnal, Vol 32, No 2, 1960, pp 255-263

The cholesterol content of the blood at rest and changes in it due to the effect of various types of exercise were investigated in 346 athletes and in 146 nonathletes of different ages.

The cholesterol content in the blood at rest is different in athletes engaged in different sports: force stresses predispose the development of hypercholesterinemia, but speed stresses and prolonged performances for endurance prevent its development.

The blood cholesterol level rises with age, but age hypercholesterinemia is absent in middle-aged athletes (over 40).

The changes in the blood cholesterol content while performing various physical exercises depend on its initial level, the nature of the physical exercises, their emotionablity, the performance conditions, and the degree of training of the athletes.

The results of the study also show that in persons of middle and advanced age who had not engaged in sports previously, a drop in the blood cholesterol content is noted following systematic training in physical culture classes.

144. Soviets Constructing Nine Soundproof Chambers

"At the Scientific Physiology Center," (unsigned article); Moscow, Meditsinskiy Rabotnik, 2 Sep 60, p 3

"The scientific physiology center near Leningrad continues to expand its experimental base. Here, the construction of the largest laboratory building has been completed. In the building, which has an area of 24,000 cubic meters, there are laboratories of genetics, endocrinology, physiology, digestion, ontogenesis of higher nervous activity, the physiology of blood circulation, and others.

"The outfitting of nine soundproof rooms with control panels has begun in the new building. A studio and film laboratory for shooting scientific films of the life and behavior of experimental animals is also being installed here."

145. Public Health Activities in Amur Oblast

"Activity of the Scientific Society of Hygienists, Sanitation Physicians, Epidemiologists, Microbiologists, and Specialists in Infectious Diseases of Amur Oblast," by P. F. Obukhov and N. Ya. Katyukhin; Moscow, Zdravookhraneniye Rossiyskoy Federatsii, No 7, Jul 1960, pp 45-46

The authors of this article discuss the activities of the Scientific Society of Hygienists, Sanitation Physicians, Epidemiologists, Microbiologists, and Specialists in Infectious Diseases of Amur Oblast. This society has been in existence in Blagoveshchensk for 2 years. Its membership consists of 4 hygienists, 5 sanitation physicians, 6 epidemiologists, 5 microbiologists, and one specialist in infectious diseases. Five of the members of this society are candidates of medical sciences.

Investigation of sanitary conditions in Amur Oblast was the first task undertaken by the society. On the basis of findings of this investigation, the society took a hand in assisting health agencies in their sanitary and epidemic control work. This society has also been striving to raise the qualifications of sanitation physicians and to improve the work of sanitary agencies of the oblast.

Members of the society have helped in the study of the sanitary condition of water supply in the cities of Blagoveshchensk, Raychikhinsk, Zeya, and Skovorodino and in populated rural areas. A study has been conducted of sanitary working conditions in the amalgamation plants of gold mining industrial establishments of the oblast and in the coal briquetting plant. This study was conducted by an associate of the chair of hygiene in cooperation with sanitary physicians. Sanitary conditions of many food-producing establishments of the oblast have been under investigation because of incidences of food poisoning. All of this work was performed with active cooperation of associates of the chair of Blagoveshchensk Medical Institute and City Sanitary Epidemiological Stations. Much attention is now being given to the study of Urovskiy disease and endemic goiter in the oblast and, in connection with that, the water supply to the population within endemic centers. A study has been completed of physical development of students in the primary and secondary schools of Blagoveshchensk and also of feeding of children in kindergartens. A survey is being conducted to determine frequency of occurrence and distribution of various diseases, particularly those of enteric origin.

Reports have been read and discussed at various meetings of the society. The following are some of the reports read: "Urovskiy Disease in the Amur Oblast," by Assistant Yu. Ya. Yatsek; "Sanitary Condition of Water Supply in Some Cities and Populated Areas of Amur Oblast," by Docent P. F. Obukhov; "Sanitary Conditions in Blagoveshchensk and Measures Undertaken to Clean It Up," by Chief physician of the City Sanitary Epidemiological

Station S. G. Parfenova; "Concerning Purification and Disinfection of Sewage of the Oblast Hospital," by sanitation physician of the oblast Sanitary Epidemiological Station F. K. Shchetnitskiy; "Sanitary Working Conditions in Amalgamation Plant of the Mine imeni S. M. Kirov," by Assistant V. P. Grebenkina; "Endemic Goiter in Amur Oblast," by Assistant A. I. Ostroglazov; "Iodine in Natural Waters of Amur Oblast," by Docent P. F. Obukhov; and "On the Question of Atypical Forms of Dysentery," by Docent I. M. Pruzhanskaya and Assistant N. N. Ostrovskiy.

Members of the society decided, on the basis of some reports, to recommend that the oblast Executive Committee, the Council of National Economy, and the Blagoveshchensk City Executive Committtee improve the working conditions in industrial establishments, improve water supply in populated rural areas, and formulate plans for the organization of public service in cities. The working conditions in the amalgamation and coal briquetting plants have improved considerably since the concentration of mercury vapor in the air was reduced to the permissible level. The concentration of mercury vapors in the air of amalgamation plants was too high before.

Members of the scientific society took part in selecting sites for construction for principal water supply installations in Blagoveshchensk, in discussing the general plan for constructing a sewer system in the city, and in dissemination of political and scientific information among the people of the oblast.

146. Better Psychiatric Care Facilities Organized

"Concerning Further Improvement in Psychiatric Service," by Z. N. Serebryakova; Moscow, Zhurnal Nevropatologii i Psikhiatrii imeni S. S. Korsakov, Vol 60, No 6, 1960, pp 641-644

The author of this article states that psychiatric service to the Soviet population is one of the more important branches of the Soviet health system and that proper organization of psychiatric aid could create the groundwork for attempts at preventing nervous diseases and mental disorders among the people of the Soviet Union.

The Seven-Year Plan for development of a network of health establishments specifies that the number of beds available in psychiatric establishments is to be 1.6 times greater in 1965 than it was in 1958. The Ministry of Health USSR gave its approval to construction of buildings with facilities to handle all principal forms of inpatient and outpatient psychiatric service, workshops for occupational therapy, solariums, etc. These buildings are expected to have a capacity of between 300 and 600 beds.

A directive, No 225, issued on 30 April 1959 by the Ministry of Health USSR ordered all Ministries of Health of union republics and local health agencies to organize workshops for mental patients in which occupational therapy could be practiced. The Ministry of Health USSR also directed the State Planning Institute for the Design of Medical, Sanitation, and Prophylactic-Therapeutic Buildings (GIPROZDRAV -- Gosudarstvennyy Proyektivnyy Institut Po Proyektirovaniyu Medikosanitarnykh i Lechebnoprofilakticheskikh Sooruzheniy) to design an occupational therapy shop and a solarium of 150 spaces in which special types of work can be performed. Activity within workshops is to be coordinated as much as possible with local industrial establishments so as to facilitate obtaining both the necessary raw material and the sale of articles manufactured by patients

Profits that workshops of psychiatric establishments derive from sale of articles manufactured by their patients have been exempted from taxation by the government, and they are free to use these profits for expanding and improving their shops. The main mission of the the workshops is occupational therapy and training of mental patients; operation of workshops purely for profit is inadmissible.

Radiology

147. X-Irradiation Effects on Conditioned Reflexes in Rabbits

"X-Irradiation Effects on the Higher Branches of the Central Nervous System in Rabbits," by G. Z. Abdullin, Yezhegodnik. In-t Eksperim. Med. AMN SSSR (Annual of the Institute of Experimental Medicine, Academy of Medical Sciences USSR), 1957-1958, pp 76-80; (from Referativnyy Zhurnal -- Biologiya, No 7, 10 Apr 60, Abstract No 32314, by E. B. Glikson)

"No noticeable changes were observed in the conditioned reflexes and in the general behavior of rabbits in which conditioned reflexes to sound stimulation were developed during a period of 7-34 days after the local irradiation of the head by 110-220 r. After another irradiation by 500-1,200 r, both the excitory and inhibitory processes were weakened. A third irradiation by 1,020-2,000 r (10-114 days later) caused still more profound changes; and after a fourth irradiation (14-37 days later) by 1,500-2,000 r, additional disruptions were observed in motion coordination (ataxia, dizziness, etc.). During the 20-30 minutes after irradiation with higher doses, a phase of precipitous decrease, of conditioned reflexes was evident; a few days later, this phase was replaced by short increases to the original level; then a second phase of sharp inhibition was followed by a period of restoration. During the period of inhibition of conditioned reflexes, a decrease was noted also in the unconditioned feeding reflexes, but this was of a lesser degree, and restoration occurred more rapidly."

148. Injury to Central Nervous System Aggravates Radiation Sequelae

"Change in Certain Functions of an Injured Spinal Cord in Irradiated Turtles," by L. S. Gazalyan (presented by E. A. Asratyan, at the Academy of Sciences of the Armenian SSR, on 5 November 1959), Sector of Radiobiology, Academy of Sciences, Armenian SSR; Yerevan, Doklady Akademii Nauk Armyanskoy SSR, Vol 30, No 2, 1960, pp 121-123

Tests were performed on three series of turtles: turtles X-irradiated and subjected to trauma by hemisection of the spinal cord, X-irradiated animals with intact spinal cord, and unirradiated animals with spinal cord hemisection at the level of the first dorsal vertebra.

Various studies on muscle tonus, threshold of skin sensitivity, general behavior, and mobility indicated that the sequelae of ionizing radiation are much more severe in an organism suffering from a traumatized spinal cord than in an X-irradiated animal with an intact spinal cord.

149. Betatron Laboratory at Tomsk Medical Institute

"Betatron Laboratory," by Prof I. Toroptsev, Tomsk Medical Institute; Moscow, Meditsinskiy Rabotnik, 19 Aug 60, p 3

The use of radiations generated by a betatron for treating oncological patients was proposed by A. G. Savinykh, Corresponding Member of the Academy of Medical Sciences USSR, who also organized a betatron laboratory for therapeutic purposes at the hospital clinic. Prior to the establishment of the laboratory at the institute, the biological effect of high-energy gamma-quanta generated by the betatron, which had been established at the Polytechnical Institute, were studied. The construction of a second betatron for experimental purposes then became necessary.

Preliminary research had shown that local necrosis occurred following the local irradiation of various portions of organs (lungs, liver, stomach, etc.); in view of this, changes in the peripheral blood seemed insignificant. It was also shown that, to prevent the development of allergic reactions, the intervals between various irradiations should not exceed 2-3 days.

The extravascular formation of crystals from red blood elements was very typical of radiation injury caused by irradiation originating from a betatron.

G. P. Garganeyev, while doing research at the prominent Betatron Laboratory, detected induced activity as a result of gamma-neutron reaction.

Studies of the distribution of radiation doses from the betatron in phantoms made of various materials are promising with regard to their value in prescribing individual treatments for cases of malignant neoplasms.

A dose of 25 million electron volts is recommended for treating malignancies by betatron-generated radiations. Profs B. S. Polzner, 1958, and A. G. Fetisov have done research on betatron therapy.

150. Glucose Absorption in Combined Radiation Sickness and Burn Trauma

"Changes in Glucose Absorption During Combined Radiation Injuries (Whole-Body Irradiation Combined With Burns)," by D. A. Golubentsev and N. A. Shevyreva; Moscow, Eksperimental'naya Khirurgiya, No 3, May/Jun 60, pp 57-58

The rate of absorption of a 40% glucose solution (800 mg/100 g body weight) administered through a catheter into the stomach of rats subjected to third-degree burns and whole-body X-irradiation by 700 r was determined.

It was found that in combined radiation injury and burn trauma, the disruption of glucose absorption was more acute during the first few days; absorption rates on the 1st, 2d, 4th, and 6th days were 34, 38, 31, and 26% respectively. The decrease in the glucose absorption rate was temporary and paralleled the histological changes in the mucous membrane of the intestine.

The authors present the following conclusions:

> Whole-body irradiation in combination with burn trauma caused a more acute and protracted decrease in the rate of glucose absorption from the rat intestine than did irradiation alone.
>
> The disturbance in glucose absorption from the intestine during the development of radiation sickness and during combined radiation injuries was neither irreversible nor catastrophic even in the case of absolutely lethal injuries.

151. Necessity of Curtailing Radiation Burns Emphasized

"Radiation Burns," by V. A. Polyakov, Central Institute of Traumatology and Orthopedics, Ministry of Health USSR; Moscow, Khirurgiya, No 6, Jun 60, pp 98-104

This article discusses the specific features of radiation burns with respect to causes, types, degrees, histological picture of soft tissues, vessels, bone, etc., course and complications, and first aid and subsequent therapy. Several case histories of various sites and types of radiation burns caused by radioactive strontium-90, X-rays, and cobalt-60 are cited.

Basing his observations on the above-mentioned cases as examples, the author emphasizes the necessity of regulating and restricting the use of radioactive substances and sources of radiation to only those cases in which other clinico-diagnostic and therapeutic methods fail or are inapplicable and of observing all measures specified for safety from radiation injuries on the part of the medical personnel, and others who come in contact with sources of ionizing radiations.

152. Recommended Decontamination Dressings for Radiation-Contaminated Wounds

"The Absorption of Radioactive Phosphorus by Various Types of Dressing Material," by R. A. Besyadovskiy, First Leningrad Medical Institute imeni I. P. Pavlov; Moscow, Vestnik Khirurgii, Vol 84, No 6, Jun 60, pp 101-103

The author discusses the various health hazards resulting from the surface contamination of wounds by radioactive substances and recommends washing the surface, by which means it is possible to remove up to 20% of the contaminants during the first 2 hours.

The author studied other methods which could be conveniently applied as first aid and mentions cotton-gauze, lignin, and Sphagnum moss dressings, which have high absorption properties and increase exudation.

Since dressings become radioactive relatively quickly after their application, they must be changed frequently (2-3 times daily). Such dressings absorbed up to 40-60% of the wound radioactivity in an 8-hour application test series; and the dressing containing Sphagnum moss was the most absorbent, the easiest to apply and change, and the least traumatizing to the tissues.

153. Successful Bioelectrically Controlled Prosthetic Hand Developed

"Bioelectric Control of Prostheses," by A. Ye. Kobrinskiy, Doctor of Technical Sciences; Moscow, Vestnik Akademii Nauk SSSR, Vol 30, No 7, 1960, pp 58-61

"More than 3 years ago, a group of workers at the Institute of Machine Science, Academy of Sciences USSR, and the Central Scientific Research Institute of Prosthesis and Prosthetic Manufacture expounded the idea of utilizing the biocurrents of a living organism for the control of engineering mechanisms and devices."

This article reports on a prosthetic forearm and hand developed from this idea and controlled by the biocurrents arising from the flexor and extensor muscles remaining in the stump of an amputated forearm. Operating with a small electric motor powered by a 3-watt battery -- the entire apparatus weighing 1.2 kg -- the device picks up bioelectric signals originating in the muscles by means of externally applied electrodes, amplifies them, processes them through an electric control circuit, and transmits the resultant commands to the operating mechanism -- a pair of opposing fingers and a thumb. The strength of the bioelectric signal determines the extent of the response. The amputee can learn to "sense" the action of the device operates effectively in any body position and requires no supplementary physical movement.

Further research in the field of bioelectric prostheses will, according to the author's concluding statement, be directed at extending the motor possibilities of the prostheses and looking for other applications of bioelectric control systems in medicine and engineering.

The article is illustrated by a schematic diagram of the device and a myogram-occillogram recording of one cycle of the joint movement of the device and the bioelectric current in the controlling muscle. (183)

154. Lapinized Hog Cholera Vaccine Tested in BSSR

"Testing of a Lapinized Vaccine Against Hog Cholera on Threatened and Affected Farms of the BSSR," by M. Ye. Antonova, V. I. Kraynova, and A. I. Gavrechenkov, Byul. Nauchno-Tekhn. Inform. N.-I Vet. In-t Akad. S.-Kh. Nauk SSSR (Bulletin of Scientific-Technical Information of the Scientific Research Veterinary Institute, Academy of Agricultural Sciences USSR), No 2, 1958, pp 24-25 (from Referativnyy Zhurnal -- Biologiya, No 6, 25 Mar 60, Abstract No 26180, by A. D. Musin)

"A 2 ml dose of vaccine was given to pigs (independent of their age and weight) intramuscularly in conjunction with a 10-20 ml dose of anti-hog cholera serum. Hog cholera was curtailed within 5-7 days after vaccination on affected farms and did not occur on threatened farms."

155. Fluorescent Sera for Diagnosis of Hog Cholera

"Preliminary Data on Fluorescent Blood Sera From Healthy Swine and Swine With Hog Cholera," by L. M. Turbin, Byul. Nauchno-Tekhn. Inform. Leningr. N.-I. Vet. In-ta (Bulletin of Scientific-Technical Information of Leningrad Scientific Research Veterinary Institute), No 6, 1958, pp 16-17 (from Referativnyy Zhurnal -- Biologiya, No 6, 25 Mar 60, Abstract No 26178, by Ye. I. Skalinskiy)

"The author tested the method of luminescence in ultraviolet rays for diagnosing hog cholera. After precipitation of blood sera of healthy swine and swine with hog cholera, erythrocytes and fibrin were removed and the sera were placed in a quartz glass test tube. The sera from swine with hog cholera, collected on the first to sixth day after the appearance of clinical symptoms of the disease, gave off pale blue and blue luminescence in 87.5% of the cases. The sera of clinically healthy animals did not fluoresce in the incubation period in 78.7% of the cases even after infection with the hog cholera virus."

156. Geriatrics Society Formed

"A New Scientific Society," by Z. Z. Shnitnikova; Moscow, Sovetskoye Zdravookhraneniye, No 11, Nov 59, p 63

This article reports that a new scientific society, the Society of Gerontology and Geriatrics, has been organized in Leningrad. Its aim is to coordinate the work of scientists who are trying to find out what changes take place in the human body as it grows older and who are searching for treatments for diseases in middle-aged and senile individuals. It is expected that the new society will draw into its fold those medical men whose scientific and practical work is related to gerontology and geriatrics.

The following specialists were selected to serve as members of the board of directors: Prof M. D. Tushinskiy and Prof Z. G. Frenkel', Active Members of the Academy of Medical Sciences USSR; and Prof V. G. Baranov and Prof D. G. Rokhlin, Corresponding Members of the Academy of Medical Sciences USSR. Prof M. I. Khvilivitskaya, Prof N. S. Kosinskaya, and some others were also picked to serve as members of the board. Prof Z. G. Frenkel' was chosen as the honorary chairman of the society. Professor Frenkel' has studied senility for almost 30 years.

It was decided to hold bimonthly conferences of members of the society to discuss ways to extend the period of active, efficient, and productive life of older workers. The scientific research which has already been undertaken consists of:

1. Clinical and physiological investigations of peculiarities of biological processes which take place in middle-aged and senile individuals.

2. Medico-statistical and demographic studies of large groups of older people, the results of which will present a general picture of conditions that accelerate the aging process and will provide a basis for formulation of necessary therapeutic and preventive medical aid.

Hospital wards of the Scientific Research Institute of Evaluation of Work Capacity and the Organization of the Work of Invalids are serving as a clinical base for gerontological and geriatric surveys. Statistical surveys are being conducted at the Scientific Bureau of Medical Statistical Methodology. The bureau has already set up a file on longevous residents of Leningrad.

The latest meeting of members of the Society of Gerontology and Geriatrics was held on 21 May 1959. Z. G. Frenkel' spoke on the significance of the organization of medical service for elderly people. This is important because the political and social structure of the Soviet Union and of the People's Democracies is resulting in an increasing percentage of elderly people in the total population. This group of people, with their skill and extensive experience, can impart useful knowledge to new generations of workers.

157. Two Soviet Institutes Expand Their Advanced Training Program

"Faculties for Advanced Training" (unsigned article); Moscow Meditsinskiy Rabotnik, 2 Sep 60, p 2

"The Main Administration of Educational Institutions of the Ministry of Health RSFSR is organizing a faculty for the advanced training and specialization of pharmacists at the First Moscow Order of Lenin Medical Institute imeni I. M. Sechenov with an annual admission rate of 200 students per year.

A similar faculty, with a capacity of 300 students, for pharmacists and engineering-technical workers in the medical industry is being organized at the Leningrad State Chemico-Pharmaceutical Institute."

158. Electrophotography of Proton Beams at Joint Institute of Nuclear Research

"Electrophotography of Proton Beams," by B. M. Golovin, I. S. Zheludev, N. T. Kashukeyev, V. M. Fridkin, and A. Antonov, Institute of Crystallography, Academy of Sciences USSR; Institute of Physics, Bulgarian Academy of Sciences; Joint Institute for Nuclear Research; Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, No 3, May/Jun 60, pp 207-208

The sensitivity of various electrophotographic emulsions to fast protons was studied with the use of the synchrocyclotron of the joint institute. The maximum intensity of the proton beam was approximately 10^8 protons/cm^2-sec, and the proton energies, 680 Mev. The emulsions studied included ZnO, ZnS, CdS, and polycrystalline sulfur, all applied to paper. The emulsions were prepared by a method explained in an earlier work (Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 2, 1957, p 286). The ZnO and polycrystalline sulfur emulsions were most sensitive to the proton beam.

The electrophotographic emulsions had greater contract but smaller photographic range than X-ray films; thus slight nonhomogeneities of the beam would be revealed more sharply on the electrophotographic paper than on an X-ray film.

The authors were guided in the work by Prof V. P. Dzhelepov and academicians G. S. Nadzhakov and A. V. Shubnikov.

[For additional information on physics, see Electronics, Instruments and Equipment.]

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USCOMM-DC-61012

Approved For Release 1999/09/08 : CIA-RDP82-00141R000100640001-3